ORDER

6000.33

Project Implementation Plan for the Air Route Traffic Control Center (ARTCC) Maintenance Control Center Processor/ Maintenance Monitor Console (MCCP/MMC)

June 8, 1988

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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FOREWORD

This order will provide overall guidance and direction for the orderly implementation of the air route traffic control center (ARTCC) maintenance control center processor/maintenance monitor console (MCCP/MMC).

The project implementation plan (PIP) establishes program management, project implementation policy, and responsibilities governing the activities of the involved organizations. The plan also identifies and describes specific events and activities to be accomplished in order to implement MCCP/MMC.

This document was prepared by Martin Marietta Information & Communications Systems, Air Traffic Control Division, under contract DTFA 01-84-C-00017, for System Engineering and Integration for Implementation of the National Airspace System Plan.

FOR James R. Etgen
Director, Program Engineering Service

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CHAPTER 1. GENERAL

1. PURPOSE. This project implementation plan (PIP) presents overall guidance and direction for the orderly implementation of the air route traffic control center (ARTCC) maintenance control center processor/maintenance monitor console (MCCP/MMC). The plan establishes program management, project implementation guidelines, and responsibilities governing the activities of organizations. The plan also identifies and describes specific events and activities to be accomplished in order to implement the MCCP/MMC.

2. DISTRIBUTION. This order is distributed to branch level within the Program Engineering, Systems Engineering, Systems Maintenance, Acquisition and Materiel, Air Traffic Operations, and Air Traffic Plans and Requirements Services in Washington headquarters; to branch level in the regional Airway Facilities divisions and FAA Technical Center; and to Air Route Traffic Control Center field offices receiving MCCP/MMC equipment.

3. AUTHORITY TO CHANGE THIS ORDER. This order may be changed only by the Director, Program Engineering Service, APS-1, or his designated representative. Requests for changes to this order should be directed to the Maintenance Automation Program Division, Attention: APS-220.

4.-19. RESERVED.

CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS.

a. The ARTCC MCCP/MMC replaces the electromechanical architecture of the original system maintenance monitor console (SMMC) with state-of-the-art, computer-controlled, color graphics equipment. The MCCP/MMC will consist of an off-the-shelf supervisory control and data acquisition (SCADA) system including hardware and software, as well as special application software that will be developed under the contract (see paragraph 31). This system consists of a communications concentrator module (CCM), a 10-megabits/second ethernet local area network (LAN), host computers, and intelligent workstations in a redundant configuration. The CCM provides the conversion required to interface the various National Airspace System (NAS) facilities, while the LAN provides the path and capability to share among the various components with the MCCP/MMC. The VAX host performs the sophisticated functions presently required by today's system engineers (SEs). It also provides the nucleus to enhance the system for future improvements.

b. The intelligent workstations provide the user-to-machine interfaces for monitoring and controlling the MCCP/MMC environment. The user-to-machine interface provides for the display of status and alarm data, for the input of functional commands, and for the storage of historical data needed to do trend analysis. The historical data and trend analysis will come from two sources: 1) through the interface to remote maintenance monitoring system (RMMS), and 2) from the archived data within the MCCP/MMC.

21. PURPOSE. The ARTCC MCC requirements for monitoring and controlling NAS facilities have been hampered by the inability of the present equipment to meet near-term needs. These requirements include organizing and unifying the SE input/output (I/O) capability, simplifying the user-to-machine interface, providing a more versatile alarm system, and allowing for future expansion. The MCCP/MMC will reduce the need for additional staffing and will improve the overall performance of the system. The NAS Plan provides for the establishment of maintenance control centers to meet these requirements.

22. HISTORY.

a. The current SMMC is the control and monitoring point for most of the ARTCC systems and services. The original SMMC was designed to provide limited real-time monitoring and status reporting for radar sites, central computer complex (CCC), computer display channel (CDC), ARTCC environment alarms, and a manually operated remote center air/ground communication facility/navigational aid (RCAG/NAVAID) status panel. The original design also included provisions for a printed hardcopy of the status changes of all the above interfaces. Additionally, the design included a random-access plan position indicator (RAPPI) for processed radar and beacon data evaluation, as well as a plan view display (PVD) to allow monitoring of digitized data for any given air traffic sector.

b. As the ARTCC mission and requirements expanded, so did the needs for monitoring and controlling new NAS systems from the maintenance control center. These needs were addressed by adding independent monitor units to the SMMC position. This resulted in increased complexity, overcrowding, and disorganization through an array of lights, displays, buzzers, and terminal messages. With the recent addition of the National Airspace Performance Reporting System (NAPRS), the SMMC has six data entry keyboards (none which share a common configuration or organization) with another set of acronyms, abbreviations, commands, and error messages.

c. As a result of this growth in monitoring and reporting devices, and complicated user interfaces, the FAA developed a prototype automated system, the enhanced system maintenance monitor console (ESMMC). The ESMMC would replace the electromechanical architecture of the original SMMC with a computer-controlled, color-graphic display and terminal equipment. In addition, upgrading the hardware enhances the proficiency of the SE by:

(1) Providing a common user interface across a variety of alarms, monitoring points, and reporting requirements.

(2) Displaying error and status messages from all interfaced systems with identification of message source.

(3) Data filtering for alarms.

(4) Providing multiple workstations with the flexibility to monitor any or all of the interfaced systems.

(5) Providing enhanced command and control functions.

(6) Providing an automated file logging system which supports reporting of failures, status, status changes, and usage.

d. The prototype ESMMC was installed, in parallel with the existing SMMC, at the ARTCC at Hampton, Georgia. The results of the development and testing efforts for the prototype ESMMC were captured in Engineering Requirements for the Maintenance Control Center Processor/Maintenance Monitor Console, FAA-E--2785, which is the specification for the system.

e. The ESMMC was intended to be a transition system which would be replaced by an end-state design derived from to-be-determined MCC requirements. Separate efforts had been identified for providing the ESMMC and the end-state MCC for the ARTCCs. Under NAS EXCOM direction, these efforts were consolidated into one project which would procure the necessary equipment for the MCC. The ESMCC specification was revised to ensure that the initial system could be augmented and enhanced to satisfy end-state requirements; the system was renamed maintenance control center processor/ maintenance monitor console and is being obtained under this project. The initial complement of hardware and software obtained under the present specification will be augmented when the end-state requirements are finalized.

Completion of work on finalization of requirements will be evidenced by NAS change proposals (NCPs) to the technical baseline (Level I design, and NAS system specification).

23. OUTSIDE CONUS ARTCCs.

a. As the operational requirements and concepts for centralized monitoring and control of NAS facilities are defined, a need could be identified for capability similar to that provided by the MCCP/MMC system at the E-ARTS/CERAP ARTCCs (Anchorage and Honolulu) and the New York terminal radar approach control (TRACON).

b. If such needs are validated and incorporated into the NAS Plan, this document will be modified to include provision for deployment of the appropriate hardware/software to these locations.

24.-29. RESERVED.

CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION.

a. MCCP/MMC will consist of three workstations, one status monitor, one alarm monitor, and processing subsystems which provide both operational and functional backup capability. The system will provide networking between the MCCP/MMC and other NAS systems.

b. MCCP/MMC software will provide control of the MCCP/MMC configuration, data archival, and data analysis, as well as device emulation, status monitoring, and alarm monitoring.

c. MCCP/MMC will provide those functions required by the SE in the performance of activities necessary to control day-to-day operations of the NAS enroute environment. These functions include:

(1) Status and/or alarm monitoring of interfaced systems.

(a) RMMS.
(b) FSDPS.
(c) CDC.
(d) NRKM.
(e) DCC.
(f) NADIN.
(g) ECM.
(h) Halon Fire Extinguisher System.
(i) DRG.
(j) PIDP.
(k) PCS.
(l) CTS.
(m) CCCH.
(n) EDARC.

(2) Command and control interface to the following systems:

(a) CCCH.
(b) EDARC.
(c) Paradyne Analysis System.
(d) Maintenance Processor Subsystem.
(e) Central Control Monitoring Subsystem.
(f) RCL.

(3) Access to data files, history files, alarm files, and information files.

(4) Data output to hardcopy devices.

(5) Control of MCCP/MMC system configuration.

(6) Automated Access to the RAPPI.

31. PHYSICAL DESCRIPTION. A Texas Instruments S/3 SCADA system will be purchased for the MCCP/MMC. The hardware provided for the SCADA system includes equipment manufactured by both Texas Instruments and Digital Equipment Corporation (DEC). A detailed description of each major component is given in subsequent paragraphs.

a. S/3 Color Console. Three S/3 color consoles and two 25-inch color CRTs will be provided with each system. The S/3 color console is a complete microcomputer system, which provides:

(1) One Color CRT, 19-inch, 480-by-640 pixel resolution.

(2) An 80386 microprocessor with 8087 floating-point accelerator capability, programmable interrupt timer, and priority interrupt controller.

(3) 512K bytes of memory.

(4) 20-megabyte (MB) Winchester disk.

(5) A 9600-baud, RS-232C communications link with the SCADA serial communication controller. This link provides the capability for remote placement from the SCADA (distances up to 100 feet). For distances greater than 100 feet, suitable line drivers or modems must be used.

(6) A video generator unit to drive the color CRT, with the additional interface module required to interface a color video copier.

(7) A console interface board which handles the console keyboard, contact output (alarm horn driver), keyswitch, annunciator touch panel, digitizer pad and pen, and trackball.

(8) A power supply which converts user-supplied ac power into the various voltages required by console components.

b. Console Keyboard. The console keyboard consists of four keypads:

(1) Display call-up/general function keypad.

(2) Software-defined (soft keys) keypads.

(3) Standard typewriter keypad.

(4) Numeric keypad.

(a) The display call-up/general function keypad consists primarily of keys used to request presentation of displays, keys which acknowledge alarms and messages, and keys which permit display editing and mode changing (S/3 color console mode to VT100 emulation mode).

(b) The software-defined keypad consists of two rows of eight keys. The functions of the keys are identified by the key definition information presented in the operator interaction area at the bottom of each

display. The functions of these keys may vary to meet the requirements of individual displays. Some of the allowable soft-key functions are:

1 Input value modification.

2 Alarm limit modification.

3 Control loop setpoint modification.

4 Control loop output modification.

5 Output value modification.

(c) The standard typewriter is arranged in the QWERTY format and contains all function keys necessary for data entry tasks, including programming. The numeric keypad consists of the numbers 0 through 9 in adding machine layout.

c. Keyswitch. The S/3 keyswitch is a three-position switch:

(1) Locked. No console functions are permitted. The current display continues to be updated.

(2) Supervisory. All console functions are permitted. All console enable indices (CEI) are overridden.

NOTE: Only supervisor keys can place console in the SUPERVISORY position.

(3) On. When an operator key or supervisor key is used to place the console in the ON position, and a legal password is entered, those console functions defined for the entered password are permitted for those points whose console enable index includes that console.

NOTE: Operator keys can turn the console to the ON position only.

d. Annunciator Touch Panel. The annunciator touch panel consists of 64 touch-sensitive lamps arranged in a 4-column-by-16-row matrix to the right of the color console. Each lamp can be blinked, turned on, or turned off by different types of software commands when events requiring operator attention occur. When an operator touches a lamp, an appropriate predefined function is performed. The top row of lamps is reserved for alarm functions. The other lamps may be defined for alarm groups, or for any other purpose. The annunciator touch panel, once defined, serves as a custom keyboard.

e. Digitizer Pad and Pen. The digitizer pad and pen are used in the creation of custom graphics. They are housed in the drawer of the console cabinet. When the pen is touched to the surface of the pad, the pad delivers corresponding coordinates to the console, which is interpreted by console software and identified as graphics display items with their positions display items on the CRT screen.

f. Trackball. The trackball is a fast and accurate, two-axis cursor-positioning device which requires a minimum amount of operator training and skill. The trackball assembly contains a plastic ball which rotates freely in any direction without any limiting mechanical stops. When the operator moves the ball, position devices within the trackball resolve the ball's motion into orthogonal (X and Y) components.

g. Communication Concentrator Module (CCM). The S/3 CCM is available in a variety of configurations. All configurations include the following types of components:

(1) CCM chassis, a front-access mounting unit for central processing unit (CPU) boards, ethernet boards, and a variety of communications boards.

(2) Backplane, providing 12 board connector slots. The right-most slot is reserved for the CCM CPU board, with the remaining slots available for ethernet and communication boards.

h. Master Processor Board.

(1) The 86/35 CCM CPU board is a single-board computer responsible for overall control of the CCM. The CCM CPU board provides a 16-bit 8086 microprocessor, 512 kilobytes (Kb) of random-access memory (RAM) expandable to 1 Mb, up to 256 Kb of programmable read-only memory (PROM), an RS-232C serial communications port, and multibus interface compatibility.

(2) The CCM CPU board is a bus master but can also act as a slave RAM device. When not in control of the multibus interface, the CPU board retains priority in accessing its RAM but can also allow RAM access to the current bus master.

i. Peripheral and Communication Transfer Switches.

(1) The peripheral transfer switch (PTSW) and communications transfer switch (CTSW) used by the S/3 host are modular (0/8/16) data communications switches manufactured by T-bar. For example, the 24-multichannel PTSW consists of:

(a) Manual control, lighted, pushbutton panel providing operator capability to switch a single peripheral channel.

(b) A 24-channel dry contact gang switch bank.

(c) Power supply for switching.

(d) Control and power cables.

(e) One key switch providing security by ignoring operator switching requests when locked in the off position. For example, the eight-channel CTSW consists of:

1. Manual control, lighted, pushbutton panel providing operator capability to switch a single communications channel.

2. Eight-channel dry contact gang switch bank.

3. Power supply for switching.

4. Control and power cables.

5. One key switch providing security by ignoring operator switching requests when locked in the off position.

(2) The switches are defined for on-line, real-time data communications networks. Future upgrading of multiplexers and modems will not require modification to the switches because all RS-232C leads are switched except pin 1 ground, and pin 7 which is carried through. Manually, individual channels (PTSW/CTSW) may be switched by an operator selecting the desired channel.

(3) The watch dog timer (WDT) logic within PTSW requires a strobe from the primary host computer every 8 seconds in order for the primary to retain possession of the switched peripherals. In the event that the primary fails, and thereby stops strobing the WDT, the PTSW will switch all peripherals to the backup host (if it is still actively strobing the WDT) in less than 20 seconds. If the backup host is not actively strobing the WDT when the primary fails, the PTSW will not switch the peripherals.

j. Graphics Printer. A graphics printer will be provided as part of the hardware, but the exact printer type is not determined at this time.

k. Project I/O Complement. Field inputs and outputs are handled in remote terminal units (RTUs) which will be interfaced to the S/3 host via a CCM.

1. Digital Equipment Corporation (DEC) Hardware. DEC's VAX computers are 32-bit machines with common instruction sets, addressing modes, and data types. As typically configured for the S/3, the MicroVAXII uses a multimaster, asynchronous Q-BUS, error correcting/detecting memory controllers, the MicroVMS operating system, a programmable internal clock, and a battery-backed, time-of-year clock. The Q-BUS enables the VAX to link with one or more Emcon S/3 CCMs via ethernet controllers; with various Emcon S/3 and DEC user-to-machine interfaces via the DMF 32 8-port serial communication board; with standard fixed-media and removable media DEC disk drives via a disk controller such as the UDA50; with standard DEC magnetic tape transports; and with other computer systems via interfaces such as the IBM system network architecture (SNA) emulator. The error correcting/detecting memory controllers detect and correct all single-bit memory errors and detect all double-bit memory errors. The VAX/VMS (virtual memory) operating system provides approximately four-billion bytes of virtual address space. Virtual addressing enables VAX machines to run programs that are larger than the physical memory allocated to them. Figure 3-1 shows the hardware system in block diagram form.

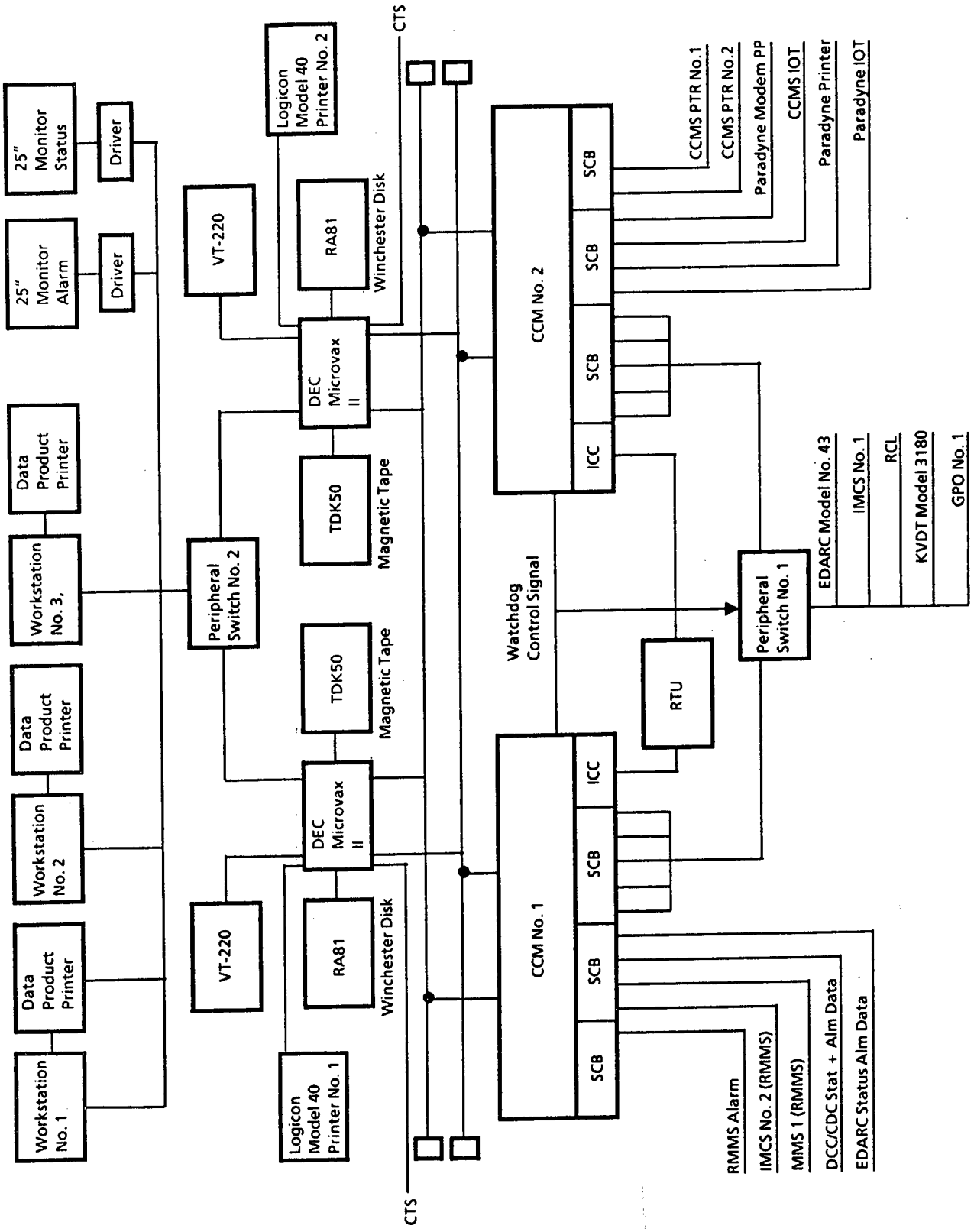

FIGURE 3-1. SYSTEM BLOCK DIAGRAM

m. Western Electric Company (WECO) 300 Telecommunications System. The two WECO 300 telecommunication system stations are presently installed at the SMMC and will be integrated by the FAA into the MCCP/MMC workstations.

n. Random Access Plan Position Indicator (RAPPI). The RAPPI currently resides in the SMMC. After the MCCP/MMC completes shadow mode of operation, the SMMC will be removed. As part of the removal process, the contractor shall repackage the RAPPI. The repackaging will include relocation of the RAPPI display and processor into a new enclosure.

o. Plan View Display (PVD). As part of the SMMC removal, the PVD that presently resides in the SMMC shall be repackaged into a stand-alone unit. The contractor will enclose the PVD to match the same physical characteristics as the RAPPI enclosure.

32. SYSTEM REQUIREMENTS.

a. Floor Space. Installation of the MCCP/MMC will comply with the transition plan developed by APS-120 and AES-420. The MCCP equipment will be installed in the MCC backroom equipment area located in the first-floor automation wing. The RTU cabinet will be installed near the data multiplexing network (DMUX). The majority of the RTU inputs are from the data receiver equipment. The MMC equipment will be installed in the E-complex area. Initially, the MMC will be located adjacent to the SMMC to support shadow mode of operation. Once the SMMC is removed, the MMC will then be relocated to the SMMC area.

b. Workstation Environmental Specifications.

Temp	Relative Humidity (noncondensing)	Altitude	Heat Dissipation
5-40 Deg C	10% - 90%	2550m	330 Kcal/hr
(41-104) Deg F		(10,000 ft)	(1300 BTU/hr)

c. Color Console Power Specifications.

ac Line Vrms Tolerance	Line Freq Tolerance	Line Current (surge)	Power Dissipation
90-132 Vrms	47-63 Hz	5.6A (15A)	380w/500VA
180-248 Vrms	50/60 Hz	2.8A (30R)	
198-242 Vrms		2.5A (30A)	

d. VAX Operating Environment Specifications.

Unit	Temp	Relative Humidity	Altitude	Heat Dissipation
Micro	15-32 Deg C	20-80%	2400m	600 Kcal/hr
VAX	(59-90 Deg F)		(8000 ft)	(2360 BTU/hr)

e. VAX Processor ac Power Specifications.

Unit	Line Voltage Tolerance	Line Freq Tolerance	ac Power Consumption
Micro	88-128 Vrms, 60 Hz	47-63 Hz (60 Hz)	690w/1.1KVA
VAX	176-256 Vrms, 50 Hz	47-63 Hz (50 Hz)	

f. Disk Drive Operating Environment Specification.

Device	Temp	Relative Humidity	Altitude	Heat Dissipation
RA81	10-40 Deg C	10-85%	2400m	551 Kcal/hr
	(50-104 Deg F)		(8000 ft)	(2185 BTU/hr)

g. Disk Drive Power Specifications.

Device	Voltage Tolerance	Line Current (surge)	Phases	ac Power Consumption
RA81-AA/CA	90-128VAX/60 Hz	3.5A	1	496w/511VA

h. Video Terminal Operating Environment Specifications.

Device	Temp	Relative Humidity (noncondensing)	Altitude	Power Dissipation
VT-220	10-40 Deg C	10-90%	2400m	54 Kcal/hr
	(50-104 Deg F)		(8000 ft)	(410 BTU/hr)

i. Type 4 RTU Environmental Specifications.

Temp	Relative Humidity (noncondensing)	Altitude	Heat Dissipation
0-50 Deg C	10-90%	2550m	706 Kcal/hr
31-104 Deg F		(10,000 ft)	2800 BTU/hr

j. Type 4 RTU Power Specifications.

ac Line Vrms Tolerance	Line Freq Tolerance	Line Current	Heat Dissipation
98-132 Vrms @ 120v	57-63 Hz	12A @ 120v	800w/1150VA
196-250 Vrms @ 220v		6A @ 220v	

k. Printer Power Specifications.

Model: TBD Voltage: 120V Freq: 50-60 Hz

Phase: 1 Current (ac): .87A

Thermal Dissipation: 120 NEMA Rate Type: 5-15R

l. PTSW Environment Specifications.

Heat Dissipation
89 BTUs/hr

m. PTSW Power Specifications.

Unit	Line Voltage Tolerance	Line Freq Tolerance	Altitude	AC Power
PTSW	Unknown	47-63 (60 Hz)	Unknown	26 watts

n. CCM Environment Specifications

Heat Dissipation
1640 BTU/hr

o. CCM Power Specification.

Unit	Line Voltage Tolerance	Line Freq Tolerance	Altitude	AC Power
CCM	Unknown	47-63 (60 Hz)	Unknown	480 watts

33. INTERFACES. MCCP/MMC provides interfaces to external systems via the RTU and the CCM. The RTU is used to detect discrete signals, while the CCM supports communications protocols to perform terminal emulation and message detection. The following interfaces are planned for MCCP/MMC.

a. Host Central Computer Complex (CCCH). The MCCP/MMC interface to the host CCC will be via both the RTU and the CCM. The RTU interface will serve to detect the system alarm relay states at the host CPUs, while the CCM interface will serve to emulate the necessary host KVDT interfaces for both host control and status information.

b. Enhanced Direct-Access Radar Channel (EDARC). The MCCP/MMC interface to EDARC will be via the redundant CCM. The CCM 1 and CCM 2 interfaces will emulate the EDARC Model 43 console, while EDARC status and alarm will be via the CCM 2.

c. Remote Maintenance Monitoring System (RMMS). The MCCP/MMC interface to the RMMS will be via the CCM which will emulate the Tandem 6530 terminal.

d. Central Control and Monitoring System (CCMS). The MCCP/MMC interface to the CCMS will be via the CCM which will emulate both the Model 43 console and the Model 40 printer.

e. Paradyne Modem Analysis System. The MCCP/MMC interface to the Paradyne system will be via the CCM which will emulate the Televideo Model 924 terminal.

f. Flight Service Data Processing System (FSDPS). The MCCP/MMC interface to the FSDPS will be via the RTU which will sense the FSDPS alarm relay state.

g. Computer Display Channel (CDC). The MCCP/MMC interface to the CDC will be via the RTU and the CCM. The RTU will detect both remote relay closures and communications signals from the CDC, while the CCM will accept the 17-bit status message from the CDC.

h. Non-Radar Keyboard Multiplexer (NRKM). The MCCP/MMC interface to the NRKM will be via the RTU which will detect the eight discrete status lines from each NRKM.

i. Display Channel Complex (DCC). The MCCP/MMC interface to the DCC is similar to the CDC interface.

j. National Airspace Data Interchange Network (NADIN). The MCCP/MMC interface to the NADIN 1a will be via the RTU which will detect the NADIN power signal and the system alarm signal.

k. Environmental Control Module (ECM). The MCCP/MMC interface to the ECM will be via the RTU which will provide detection for CTS, fire, radiation, and security alarms. An additional 20 remote switch closure detection circuits will be provided for site-specific applications.

l. Halon Fire Extinguisher System. The MCCP/MMC interface to the Halon system will be via the RTU which will detect a zone 1 or zone 2 alarm and provide for an additional four Halon alarms.

m. Data Receiver Group (DRG). The MCCP/MMC interface to the DRGs will be via the RTU which will detect channel disable, timing error, and errors for each DRG channel (nine signals). The interface will accommodate up to 18 DRGs.

n. Programmable Indicator Display Processor (PIDP). The MCCP/MMC interface to the Penril will be via the RTU which will monitor the loss of the carrier detect signals.

o. Power Conditioning System (PCS). The MCCP/MMC interface to the PCS will be via the RTU which will detect the maintenance alarm, provide 45 status inputs, and monitor the elapsed time for the on battery condition.

p. Coded Time Source (CTS). The MCCP/MMC interface to the CTS will be via the Microvax II which will collect system time messages via this interface.

q. Radio Communication Link. The MCCP/MMC interface to the RCL will be via the CCM which will emulate the AT&T Data Speed 4410 Display Terminal.

34.-39. RESERVED.

CHAPTER 4. PROJECT SCHEDULE AND STATUS

40. PROJECT SCHEDULES AND GENERAL STATUS. See figure 4-1 for the MCC Development Schedule and figure 4-2 for the Implementation Schedule.

41. MILESTONE SCHEDULE SUMMARY. The first system delivery is scheduled for July 1988 in Atlanta. The first operational readiness date (ORD) is scheduled for August 1988. Site preparation for the first sites will have to be started 3 to 6 months prior to system delivery. A summary of activities at the site is shown in figure 4-2.

42. INTERDEPENDENCIES AND SEQUENCE. MCCP/MMC has no interdependencies with other systems that will affect its capability to achieve functionality.

43.-49. RESERVED.

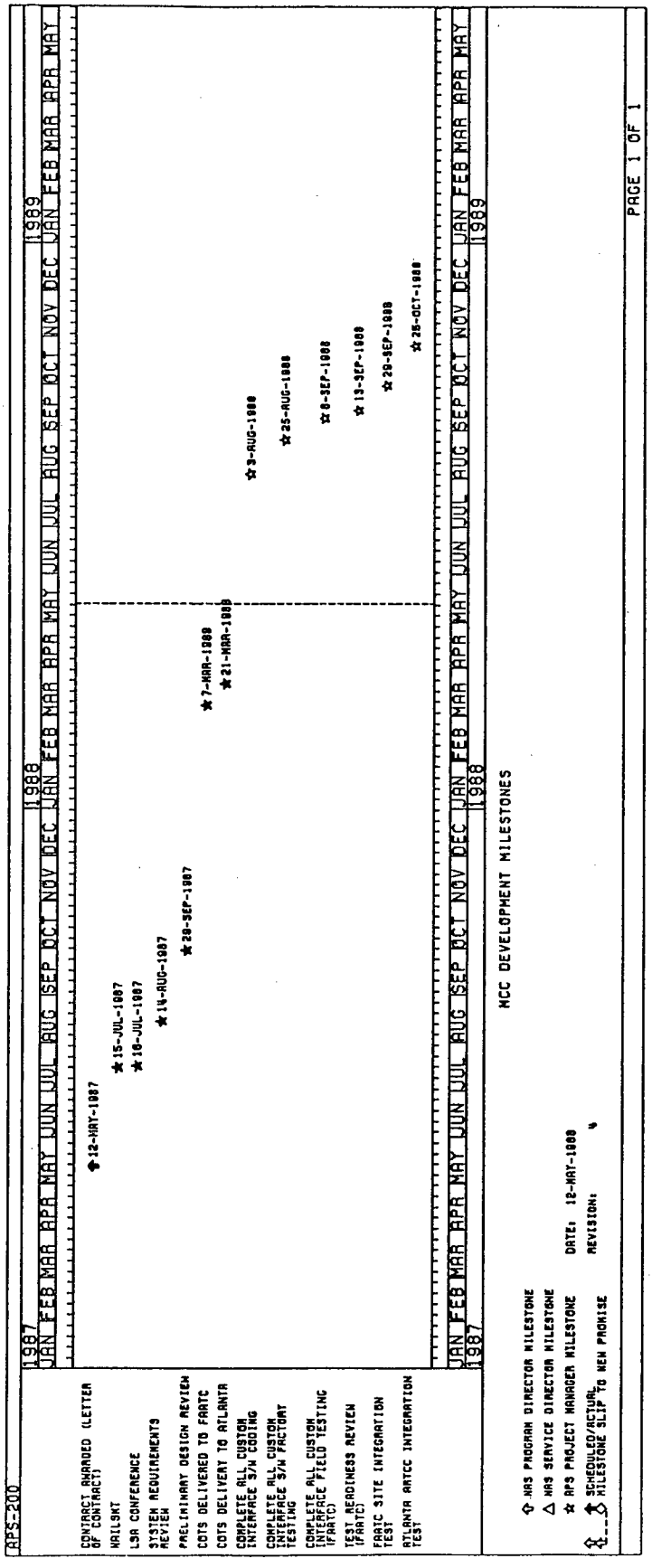

FIGURE 4-1. MCC DEVELOPMENT MILESTONE SCHEDULE

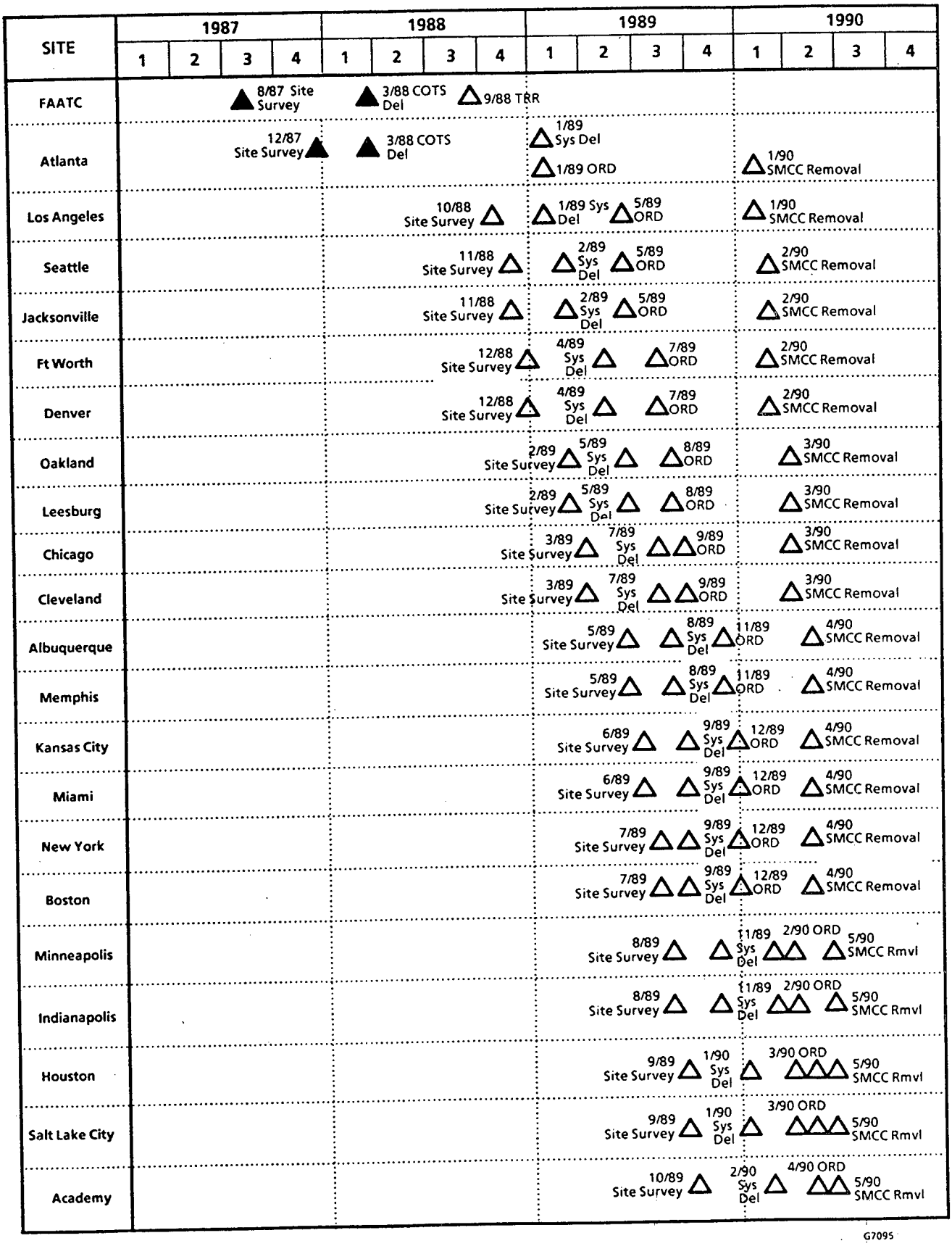

FIGURE 4-2. MCC IMPLEMENTATION SCHEDULE

CHAPTER 5. PROJECT MANAGEMENT

50. PROJECT MANAGEMENT, GENERAL. The overall technical management of the MCCP/MMC project is the responsibility of the Maintenance Automation Program Division, APS-200. This organization will accomplish management tasks within the guidelines provided by FAA policies, procedures, and directives. A member of this organization is designated project manager and is the single focal point for all project activities. The technical officer position is filled by the designated project manager, and provides technical guidance and direction to the contractor within the scope of the contract. The project manager will ensure that the contractor has access to technical documentation, appropriate data bases, and sources of information relative to government-furnished equipment (GFE). A contracting officer is designated by ALG-330 to perform the general contract management activities to assure that the terms of performance under the contract are met. The contracting officer is the only person authorized to make changes that will affect prices, deliverables, or schedules.

a. FAA Headquarters. The following organizations within FAA headquarters, Washington, D.C., will fulfill the indicated responsibilities required for project implementation.

(1) Maintenance Automation Program Division.

(a) Provide technical surveillance of the contractor in the design, development, testing, installation, integration, and production of hardware and software for the MCCP/MMC contract. Ensure that all technical contract requirements are met.

(b) Provide program guidance to all offices, services, and regions on the implementation of the MCCP/MMC project, which includes, but is not limited to:

1. Site installation.

2. Disposition of excess equipment.

3. Provisioning.

4. Updates to maintenance concept.

5. Training.

6. Configuration management.

7. Documentation deliverables.

8. All test phases.

9. Joint acceptance inspection (JAI), operational readiness demonstration (ORD), operations changeover.

(c) Act as chairman for working groups established to support the MCCP/MMC project.

(d) Manage the interdependencies between the MCCP/MMC project and those programs which interface with the MCCP/MMC project.

(e) Provide membership to the maintenance automation program configuration control board (CCB).

(f) Provide membership to the program planning group.

(2) Air Traffic Operations Service (ATO). Installation of equipment, particularly in the control room, and any testing must be thoroughly coordinated with Air Traffic ARTCC personnel; e.g., the assistant manager for plans and programs in each ARTCC. Certain testing procedures will need to be done during periods of low activity, which must be determined and approved by Air Traffic management. Activities must be scheduled to minimize any operational impact and ensure the integrity of NAS. The ATO service will be asked to:

(a) Assist in the development of operations changeover plans with APS, regions, and FAA Technical Center.

(b) Ensure that all operational aspects of system implementation are satisfactorily dealt with by the regions prior to operation changeover.

(3) Systems Engineering and Integration (SEI) Contractor Management. Provide support to the Program Office in the acquisition phase of the project with resources dedicated to APS. The SEI contractor will also support the FAA regions and the specific ARTCC onsite coordinators in the development of plans and procedures for system installation integration and test at each site. In addition, the SEI contractor will assist in the accomplishment of specific tasks at the request of the onsite coordinators.

(4) Acquisition and Materiel Service (ALG).

(a) Provide policy and procedural guidance to AF regions and the Mike Monroney Aeronautical Center for appropriate MCCP/MMC property controls prior to commissioning.

(b) Assist APS in providing procedures for the disposal or use of surplus materiel.

(c) Furnish a quality reliability officer on an as-needed basis for in-plant quality and reliability assurance. Provide industrial engineers to support the test manager/test engineer.

(d) Provide membership to the program planning group.

(e) Provide membership to the CCB.

(f) Develop a supply and provisioning policy, and the portion of life-cycle costing dealing with supply support.

(5) National Automation Engineering Field Support Sector (ASM-160).

(a) Provide membership, as required, to the CCM.

(b) Provide MCCP/MMC engineering, testing, integration, and deployment support to the regions. This support is to be outlined in task agreements.

(c) Provide operation and maintenance services for the MCCP/MMC.

(d) Develop system shakedown test plans and procedures.

(e) Develop operational test and evaluation plans and procedures.

b. Field Organizations. The responsibilities of the FAA Technical Center, regions, and other field organizations are discussed in the following paragraphs.

(1) FAA Technical Center. Provide the necessary support to test and evaluate the project functional and operational performance, and to assure compliance with the appropriate specification. The FAA Technical Center will perform these duties in accordance with FAA Action Notice, A 1810.1.

(a) Provide membership, as required, to the CCB (ACT-110).

(b) Provide MCCP/MMC engineering, testing, integration, and deployment support to the regions. This support is to be outlined in task agreements.

(c) Provide operation and maintenance services for the MCCP/MMC (ACT-600).

(d) Provide support in the definition and validation of system level requirements for T&E.

(e) Provide support to the project manager in the preparation of test plans, procedures, and reports and conduct testing prior to shakedown testing.

(f) Maintain the documentation in accordance with the latest edition of FAA Order 1750.6, NAS Documentation Facility.

(g) Establish financial and item management control and accountability for all agency property received at the FAA Technical Center (ACT-600).

(h) Develop system shakedown test plans and procedures (ACT-600).

(2) Mike Monroney Aeronautical Center.

(a) Provide logistic support service and planning (FAA Depot).

(b) Accomplish cataloging and provisioning for MCCP/MMC equipment (FAA Depot).

(c) Provide parts-common and parts-peculiar for support of MCCP/MMC systems (FAA Depot).

(d) Provide national project materiel which is not procured by ALG (FAA Depot).

(e) Develop, monitor, and conduct MCCP/MMC training programs, as directed by APT-300 (FAA Academy).

(f) Adapt national engineering specifications to local conditions, and perform engineering services within nationally provided guidelines for the installation, inspection, and acceptance of the MCCP/MMC system, including subsystem components, at the FAA Academy (ASM-150).

(g) Provide for technical supervision of onsite activities performed under the contract at the Mike Monroney Aeronautical Center (ASM--150).

(h) Accomplish preliminary acceptance of items delivered to the academy under the contract (ASM-150).

(i) Develop, in conjunction with the ALG and APS-220, logistics policies and plans for support of the system.

(j) Participate in planning activities for the transition of the system equipment into the logistics inventory (ALG).

(k) Participate, as requested by APT-300, in the review of instruction books (FAA Academy).

(l) Assure timely selections of necessary instructor and maintenance personnel to meet Mike Monroney Aeronautical Center training and staffing requirements (FAA Academy).

(3) Regions. The regions will ensure that facilities and engineering work are complete prior to delivery of equipment. The regions and ARTCCs have

appointed MCCP/MMC coordinators (see appendix 1) who will monitor the installation of the equipment and coordinate requests for contractual or technical support with APS-220 and the National Automation Engineering Field Support Sector, ASM-160. The regions will arrange for the appointment of a technical representative at each facility. The regions will fulfill the following responsibilities:

(a) Maintain safe and efficient movement of air traffic during the implementation of the MCCP/MMC system into the operational environment.

(b) Prepare the site and monitor equipment installation, per the installation schedule. Coordinate with APS-220 on any changes to this schedule.

(c) Designate, in coordination with the sector manager, a technical onsite representative (TOR) to serve at each facility. The TOR is to provide the regional coordination, direction, and guidance necessary for effective and timely accomplishment of site preparation functions during the implementation at the site to which assigned. This includes onsite decision making and day-to-day problem solving. The TOR is to be the principal onsite regional representative and will report problems, progress, and other matters to the regional Airway Facilities division.

(d) Provide input to APS-220 relating to regional logistics requirements.

(e) Participate in the development of the system shakedown test plan.

(f) Conduct system key site and operations changeover testing in accordance with the requirements of the test plans for these functions.

(g) Develop the required environmental and as-built records.

(h) Generate the operations changeover test plan based on the Installation/Checkout/Site Integration Plan described in paragraph 56.

(i) Conduct the final JAI and the formal MCCP/MMC certification exercise (commissioning) for designated facilities.

(j) Generate site-specific adaptation data for the creation of system load tapes.

(k) Establish financial and item management control and accountability for all agency property received in the region.

(l) Assign a central representative(s) from the regional airway facilities division to provide guidance and assistance to the TORs at each site, and monitor the overall progress of the project from site preparation through operational changeover.

(m) Provide proper administrative channels of communication to assure the Maintenance Automation Program division's full cognizance of project status at all times.

51. PROJECT CONTACTS. Appendix 1 contains a list of regional representatives and ARTCC onsite coordinators for the MCCP/MMC project.

52. PROJECT COORDINATION. APS-200 has the overall responsibility for managing the procurement and installation of the MCCP/MMC. APS-220 is the technical office and shall be the point of contact for all project-related activities. Technical direction to the contractor(s) within the scope of the contract will be provided by the technical office. The contact point for regional support activities will be appointed TORs.

53. PROJECT RESPONSIBILITY MATRIX.

TASK/PLAN/ACTIVITY	PRIMARY OFFICE	SUPPORTING OFFICES
Preliminary Installation Schedule	APS-220	Regions
Training Programs	APT-300	APS-220, ASM-210, AAC-942C
Schedules and Assignments	APS-220	Regions, AAC, ASM-160
Configuration Management (H/W & S/W)	AES-410	ASM-160, Regions, APS-220
Software Maintenance (Operational)	ASM-160	APS-220, Regions
Software Maintenance (Diagnostic)		APS-220, Regions
System Maintenance Procedures Handbook	ASM-160	Contractor
Master Test Plan	APS-220	ACT-110/ACT-570
Integration Test Plan	ACT-110 AES-420	Contractor, APS-220, ACT-110, ACT-570
Integration Test Procedures	ACT-110	APS-220, ASM-160 Contractor, ACT-570

TASK/PLAN/ACTIVITY	PRIMARY OFFICE	SUPPORTING OFFICES
Integration Testing	ACT-110	APS-220, ACT-600, ASM-160, Contractor
OT&E	ACT-570 ASM-160 AES-420	Regions, APS-220, Contractor
System Shakedown Test Plan	ASM-160	APS-220, Regions, Contractor
System Shakedown Test Procedures	ASM-160	APS-220, Contractor, Regions, ACT-570
Joint Acceptance and Inspection	Regions/ Sectors	APS-220, ASM-160
Operations Changeover Test Plan	Regions	ASM-160
Disposition of Excess Equipment Plan	APS-220	AAC-400, Regions, ASM
Logistic Support Planning	AAC-400	APS-220, Regions, SEIC
Review Master Test Plan/ Test Plans	AES-420 ACT-570	APS-220, Regions, SEIC

54. PROJECT MANAGERIAL COMMUNICATIONS. Project-level communications are necessary to maintain effective and responsive control of overall progress. Frequent reviews, conferences, and working sessions will be held among FAA management, the program manager, and region TORs. Participation in these conferences and working groups by contractor personnel and/or representatives of various other FAA offices is at the discretion of the program manager.

a. Monthly Program Reviews. The program manager will conduct monthly reviews of the project status and progress. Status reviews and technical interchange meetings may be scheduled at the contractors' or regional facilities as required.

b. Program Reviews. The program manager briefs the Administrator on the status of program schedules and current program topics every quarter.

c. Program Conferences. The conferences will be scheduled as necessary. These conferences are attended by TORs from each region, the program manager,

and representatives from headquarters organizations. The conferences provide a forum to discuss and resolve program issues of special interest to the regions.

d. Communications System. The primary communications system to be used for the MCCP/MMC project will be professional office systems (PROFS). The PROFS network is used for direct exchange of information and MCCP/MMC project status among the project office, regions, and field organizations. A @secon-dary communications system, MAP Bulletin Board, will also be used to exchange program office information. This system will provide general information on the MPS enhancement, MDT, as well as the MCCP/MMC. These systems will be used to maintain effective and responsive communication between the various organizations.

55. IMPLEMENTATION STAFFING. Each region and each ARTCC will be required to support the deployment of the MCCP/MMC systems. The level of support will be the same as that provided for any other system; this will include:

a. Designation of onsite coordination.

b. Designation of technical onsite representative.

c. Technical and administrative support during contractors' installation and site acceptance test periods.

In addition, the training plan for this program calls for two representatives from the next site to receive on-the-job training at the site just installed. Details for this sequence are set forth in the training plan.

Finally, regional/sector support requirements have generally been identified for the operational test and evaluation, integration test phases to be conducted at the key sites, and shakedown testing conducted at each site. Details for these support requirements will be contained in the respective test planning documents.

56. PLANNING AND REPORTS. Each ARTCC must develop an MCCP/MMC transition plan which addresses its site-specific organizational impacts, manpower planning, scheduling, and operational requirements for the integration, test, and operational transition phases of MCCP/MMC implementation. Factors to be considered include operators, maintenance personnel, test observers, personnel training, time and equipment required for specific tests, script preparation (if required), coordination with adjacent facilities, and briefings and documentation for the specific tests. The site must perform its own integration and operational transition activities in accordance with FAA Orders 1100.134, Maintenance of NAS Automation Subsystems; 6000.15A, General Maintenance Handbook for Airway Facilities; and 6030-45, Facility Reference Data File (RFDF).

a. Contract Documentation. The contract documents governing the installation and test process are defined in this section.

(1) Master Test Plan. The Master Test Plan (CDRL B070) describes the overall testing program for the MCCP/MMC acquisition phase (AP) procurement. This document describes the general philosophy for achieving test program objectives as well as the necessary methodology and procedures. This plan defines the various test activities and their objectives and interrelationships. This document also presents the testing schedule, the organization of the test team, and the definition of test documentation to be produced.

(2) ARTCC Site Test Plan. The ARTCC Site Test Plan (CDRL B071) is a generic plan which is applicable to all the ARTCCs. It includes detailed planning information for test conduct. Information is provided to the level necessary to show adequacy of the test methods and test limits, establishing detailed requirements, criteria, general methods, and overall planning to confirm that the requirements of the specifications are fulfilled.

(3) ARTCC Site Test Procedure. An ARTCC Site Test Procedure (CDRL B072) will be prepared for each ARTCC which defines the detailed testing methods, resources, and schedules for each ARTCC. The procedure will also define the types, quantities, and configuration of equipment and software required for the testing.

(4) ARTCC Site Test Scenarios. ARTCC Site Test Scenarios (CDRL B073) will be provided for each ARTCC. These will be actual computer-readable inputs for the site testing and will include a complete listing of all test sequences accomplished by each scenario. Systems Management American (SMA) Corporation will designate all additions, deletions, or modifications that have been made to FAA-provided scenarios.

(5) ARTCC Site Test Report and Test Data. An ARTCC Site Test Report (CDRL B076) will be prepared by SMA 30 days after the completion of testing to document the results of site acceptance testing, and to identify and evaluate discrepancies between expected and actual test results. The test report will be maintained onsite and will be available for examination by the FAA. SMA will also provide the ARTCC with Site Test Data (CDRL B076) which will include all hardcopy outputs, observer/operator logs, data reduction listings, and program listings.

(6) ARTCC Site Survey Report. ARTCC Site Survey Reports (CDRL B080) will be provided to document the data essential to the efficient installation of the MCCP/MMC, including identification of any special problems or considerations, summarization of pertinent technical data, and coordination and assignment of critical action items.

(7) Installation/Checkout/Site Integration Plan. The Installation/Checkout/Site Integration Plan (CDRL B081) describes the preparation activities required prior to the delivery of the MCCP/MMC hardware to the FAA sites, and the subsequent installation and checkout of that equipment. This plan is common to all sites and describes the procedural steps, schedules, and resources required. It also describes the procedures for disconnecting the switches after decommissioning the SMMC. In addition, the plan describes the

integration of the MCCP/MMC hardware and software deliverables into an operational system capable of interfacing with GFE.

b. Test Notification. The onsite coordinators shall ensure that all parties are notified as to the schedule for testing to take place. This notification will be distributed to participating test members, site operations management, and peripheral sites, as necessary.

c. Implementation Reports. The MCCP/MMC implementation activities will be documented by the reports described in this section. These reports provide information for contract monitoring and document problems that occur during the implementation effort. Some of these reports will be prepared by the contractor and the others will be prepared under the authority of the onsite coordinator and distributed to the regional MCC representative and the Maintenance Automation Program division.

(1) Periodic Status Report. The onsite coordinator is responsible for the preparation of a periodic status report from the beginning of site preparation to ORD. It should be in narrative form and prepared weekly (or more frequently if circumstances warrant) to report activities conducted during the week and the outcome of those activities. The periodic status report will summarize the week's test notifications, exception reports, implementation procedures, problems, implementation milestones, and solutions, and will be used to expedite future MCCP/MMC implementation efforts.

(2) Initial Operating Capability Report. The onsite coordinator will send an IOC report upon the declaration of IOC. The IOC report should be in narrative format and is notification of IOC in accordance with FAA Order 6020.2A, Joint Acceptance Inspections for FAA Facilities.

(3) Initial Operating Capability Final Report. The onsite coordinator is responsible for the preparation of a final written report which will be sent within 10 days after IOC. It will summarize all test activities between operational site acceptance and IOC, including hardware, software, personnel, training, and support problems encountered during the period and the resolutions of these problems.

(4) Operational Readiness Demonstration Report. The onsite coordinator will send an ORD report upon completion of the ORD. The ORD report should be in narrative format and is notification of ORD in accordance with FAA Order 6020.2A.

(5) Operational Readiness Demonstration Final Report. The onsite coordinator is responsible for the preparation of a final written report which will be sent within 10 days after ORD. This report will summarize all test activities between IOC and ORD, including hardware, software, personnel, training, and support problems encountered during the period and their resolutions.

d. Problem Reports. The onsite coordinator must maintain a list of open items (problems that require resolution) throughout the MCCP/MMC implementation

effort. Problems should be categorized as major (to be closed prior to IOC) or minor with an appropriate suspense date. These problems should be entered into the information data base in the FAA Technical Center Central Support Facility and included in the periodic status report that is submitted to Maintenance Automation Program division. When a specific problem is resolved, the associated open item can be closed. At each ARTCC the maintenance management system will be used to maintain a log of all failures with the time that the failure occurred and the time that the equipment was returned to an operational state. This information will be included in all problem reports so that the Maintenance Automation Program division can determine the system reliability, maintainability, and availability (RMA) performance characteristics.

57. APPLICABLE DOCUMENTS. The documents listed below form a part of this PIP to the extent specified herein.

a. Specifications.

(1) MCCP/MMC ER	Engineering Requirements for the Maintenance Control Center Processor/Maintenance Monitor Console.
(2) FAA Order 1320.33B	Equipment Modification and Facility Instruction Directives.

b. Standards.

(1) MIL-STD-881A	Cost Control System.
(2) MIL-STD-1388.1A	Logistics Support Analysis.
(3) MIL-STD-1388.2A	Logistics Support Analysis Records.
(4) FAA-STD-028	Contract Training Programs.
(5) FAA-STD-036	Preparation of Project Implementation Plans.

58.-59. RESERVED.

CHAPTER 6. PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL. NAS Plan project 6-04 provides for the establishment of maintenance control centers in the ARTCC and General National Airspace System (GNAS) sectors. NCP 9488, funding for NAS maintenance control centers, establishes the funding for the initial MCCP/MMC.

61.-69. RESERVED.

CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS. This project includes the deployment of 20 MCCP/MMCs to ARTCCs, one to the FAA Technical Center, and one to the FAA Academy.

a. Deployment to the ARTCCs will commence following the deployment readiness review (DRR). The DRR will occur following the completion of contractor and FAA testing at the FAA Technical Center and the Key Site (Atlanta ARTCC).

b. The DRR is scheduled to occur May 2, 1988.

c. Systems Engineering Service (AES) provides support to the DRR. The input that AES provides is primarily concerned with validating that the system-level integration and operational tests have been conducted to assure that operational suitability and effectiveness are achieved prior to deployment.

d. The FAA Technical Center provides a recommendation based on test results in support of the DRR process to determine whether a subsystem should or should not be deployed.

e. The adequacy of project capabilities provided for logistics support, system maintenance, and specialist training will also be reviewed at the DRR by representatives of appropriate FAA organizations. Deficiencies and corrective action will be identified and scheduled.

f. The program manager will present an analysis of these results to the DRR. The systems engineering service, FAA Technical Center, and field managers will provide comments and recommendations as appropriate.

71. SITE PREPARATION. Five site surveys will be conducted to develop the critical parameters for preparing the different ARTCC facility configurations. Based on the results of these surveys, each facility will conduct a site-specific survey and develop the site-specific site preparation plans.

72. DELIVERY. The MCCP/MMC will be delivered in accordance with the delivery schedule in contract paragraph F.2.8. This delivery shall include the complete system and associated cabling.

73. INSTALLATION PLAN.

a. Scope. SMA will be responsible for receipt, placement, checkout, and integration of the MCCP/MMC during this phase of implementation. This section delineates the FAA responsibilities for the installation of the MCCP/MMC hardware and for monitoring the acceptance testing of the subsystem at the ARTCC.

b. Installation and Checkout Methodology. SMA will perform installation and checkout in accordance with the Installation/Checkout/Site Integration Plan (CDRL B081). The installation and checkout phase begins with the delivery of cables, cabinets, furniture, spare parts, tools, and test equipment, and ends with acceptance testing of the hardware. System tests will be performed by SMA in accordance with the ARTCC Site Test Plan (CDRL B071). SMA must coordinate all installation and checkout activities that may interfere with the day-to-day operation and maintenance of the existing NAS with the onsite coordinator.

c. Installation and Checkout Verification. ARTCC personnel must verify that the installation and checkout of the MCCP/MMC equipment has been accomplished in accordance with the Installation/Checkout/Site Integration Plan (CDRL B081), and must monitor testing activities to assure compliance with ARTCC Site Test Procedures (CDRL B072).

d. Compatibility Dry Runs. Prior to conducting formal ARTCC acceptance tests, SMA will perform final dry runs of the tests to ensure the compatibility and readiness of hardware, software, and test procedures for formal acceptance testing in accordance with the schedule in the Installation/Checkout/Site Integration Plan (CDRL B081). Each dry run test will be monitored by the FAA onsite coordinator to ensure that approved procedures are used, that problems encountered are properly documented, and that the tests are conducted using controlled hardware and software configurations. ARTCC personnel should monitor these final dry run tests which will provide the opportunity to fully review the test proceedings, ask questions, make recommendations, and gain the necessary insight to ensure successful formal tests.

(1) Cable Emplacement. SMA will emplace all MCCP/MMC signal and interface cables within three weeks after equipment delivery to the ARTCCs. Cabling between the shadow mode switches and the SMMC equipment will be positioned so that original cables can be removed or disconnected with the shadow mode switches. The cables from the backroom equipment to the MCCP/MMC display terminals will be emplaced by SMA under the guidance of ARTCC personnel. All signal cables will be inspected and checked out in accordance with the Installation/Checkout/Site Integration Plan (CDRL B081) prior to checkout of the system. Detailed cable listings will be provided in the Site Survey Report (CDRL B080).

(2) Equipment Emplacement. The shadow mode switches will be located in proximity to the SMMC and the MCCP/MMC display equipment as determined by the site survey and agreed to by ARTCC personnel. The switches will become the property of the FAA.

(a) Emplacement of the MCCP/MMC equipment will entail moving the equipment from the unloading area to a temporary assembly area and will be the responsibility of SMA. No special handling equipment should be necessary. The routes will have been established in advance, and any necessary actions will have been taken by the onsite coordinator and SMA to assure trouble-free movement of the equipment.

(b) SMA will position and assemble the equipment in the temporary work location which will be specified by the FAA onsite coordinator.

c. Installation. Installation tasks place the equipment in its operational configuration, using SMA installation procedures. The Installation/Checkout/Site Integration Plan (CDRL B081) describes SMA's installation activities and the performance sequence.

(1) Equipment Installations. The equipment installation tasks will include removal of any shipping brackets or tie-downs, adjusting the leveling pads so that the units rest solidly on the floor, and connecting the equipment to the appropriate power panel. Any chassis or printed-circuit boards which have been shipped separately will be installed. Units which are shipped separately but are joined together in the final installation (e.g., processor complexes) will be bolted together. All MCCP/MMC equipment will be switched from essential to the critical power bus after system reliability has been demonstrated.

(2) Interconnecting Cable Installation. SMA will install all the MCCP/MMC inter-system cables, all the cables from the MCCP/MMC to the shadow mode switches, and all the cables from the backroom equipment to the console terminals and printers. All cables which are not installed under the floor must be neatly routed and dressed in cable trays. All cable installation will be monitored by the onsite coordinator to ensure that safe and accident-free procedures are exercised.

(3) Clean-up and Inspection. SMA will ensure that the equipment is in its final self-contained operational configuration without interfaces to the GFE, and that the area is cleaned-up and put in a normal operational condition for checkout. The onsite coordinator is responsible for ensuring that no government property has been damaged by SMA during installation of the MCCP/MMC.

d. Checkout. Checkout activities include the execution of functional and diagnostic tests for operational site acceptance testing. Checkout of the installed MCCP/MMC will be conducted with standard Rexnord maintenance diagnostic programs in accordance with the Installation/Checkout/Site Integration Plan (CDRL B081). During SMA's checkout activities the onsite coordinator must ensure that appropriate support technicians are available during power-up activities.

(1) Powering-up. SMA will check the MCCP/MMC equipment to ensure that the application of power will not cause any damage to the facility equipment. All switches and circuit breakers will be examined for proper power-up positions. To minimize potential damage to the facility main power source, the MCCP/MMC will initially power-up on the essential test bus. The onsite coordinator will ensure that the appropriate site personnel are

notified prior to the application of power and that no power is applied without site approval. Initial power-on checks will demonstrate that all required functions are available, that current loads are as expected, and that the system is in a condition to permit the loading and exercise of diagnostic software. After system reliability is established, the MCCP/MMC will be switched to the critical bus for power.

(2) Diagnostic Tests. The individual units of the MCCP/MMC will be interconnected as a subsystem and tested with internal diagnostics. The subsystem will then be interconnected into the MCCP/MMC configuration as identified in the Installation/Checkout/Site Integration Plan (CDRL B081). SMA will use the manufacturer's system test procedures called for in CDRL B081. All test results will be recorded for subsequent analysis and verification. Selected test results from informal (dry run) site tests may be carried forward to satisfy requirements for the operational site acceptance tests, at the option of the FAA.

e. ARTCC Acceptance Tests. The SMA installation engineer will be responsible for actual conduct of the acceptance testing. The ARTCC onsite coordinator will provide test monitors for all formal testing. It will be up to the designated monitors to ensure that SMA complies with the ARTCC Site Test Plan and Procedure (CDRL B071 and CDRL B072); to verify the test acceptability, failure, and problem resolution activities; to participate in test data analysis; and to substantiate that testing results and all exceptions are properly documented.

(1) Test Readiness Review. The test readiness review (TRR) is used to verify SMA and FAA readiness to conduct formal site acceptance testing. The TRR will be conducted after SMA has completed informal testing (dry runs) and before the start of formal site acceptance testing. The TRR will be scheduled and chaired by the SMA onsite test manager in coordination with the FAA onsite coordinator and supported by the ARTCC MCCP/MMC implementation team. The review agenda for the TRR will include a status of the ARTCC MCCP/MMC. Prior to the start of formal testing the FAA onsite coordinator must verify that a test readiness review is performed and that this review includes the following:

(a) Verify completion of dry runs.

(b) Verify that hardware is at the proper level for the test, with changes approved.

(c) Verify that software is at the proper baseline for the test, with changes approved, retested, and incorporated.

(d) Identify test inputs and expected outputs.

(e) Review open trouble reports for impact on the test.

(f) Identify applicable test documentation and redlines, including all request for actions (RFAs); review RFAs for impact on the test.

(g) Review any open quality assessment reports (QARs) for impact on the test.

Responsibilities and ground rules for the formal acceptance tests will be discussed to include contingency plans if the expected schedule is not realized. Completion of the TRR will result in a decision to proceed with or delay acceptance testing.

(2) Pre-test Briefing. SMA will hold a pre-test briefing which will establish the readiness for conducting each formal test to be witnessed by FAA personnel. This briefing will include the status of prerequisites, software, and system equipment (MCCP/MMC and GFE). The plan for the conduct of the test will be presented and any deviations will be addressed. ARTCC personnel will participate in this briefing and must give their concurrence of test readiness prior to test conduct and must confirm that all exceptions are properly documented.

(3) Test Conduct. The formal testing activity will be performed in accordance with the approved ARTCC Site Test Plan (CDRL B071), ARTCC Site Test Procedure (CDRL B072), and ARTCC Site Test Scenario (CDRL B073). ARTCC personnel will supply GFE support and monitors, as required, during each test.

(4) Post-test Briefing. The test team will review the completed test results. The test will be discussed and anomalies noted. In addition, an assessment of the quality of the test, program technical reports (PTRs), and the impact of problems encountered will be discussed. ARTCC personnel will critique the test conduct and results.

(5) Test Interpretation. SMA will perform a preliminary post-analysis of the Test Data (CDRL B075) in preparation for the development of the Test Report (CDRL B074).

(6) Test Analysis. SMA will perform a detailed test analysis of all outputs gathered from the various tests. The test analysis verifies that the test performance and output are correct and explains any discrepancies and their significance. Program technical reports (PTRs) will be generated and retesting performed at the direction of ASM-160. ARTCC personnel will assist in performing test data analysis to ensure that data is being correctly interpreted. The detailed test analysis derived will be used as input for a final test report.

f. MCCP/MMC Hardware and Subsystem Tests. Hardware and system testing will be conducted at the conclusion of equipment installation and checkout activities in accordance with the ARTCC Acceptance Test Plan (CDRL B071). ARTCC personnel must monitor this testing to ensure that it is performed in accordance with the ARTCC Site Test Procedure (CDRL B072).

g. Shadow Mode Switch Integration. SMA will integrate the transition switches into the existing NAS in accordance with the ARTCC Installation/ Checkout/Site Integration Plan (CDRL B081). The onsite coordinator will coordinate and plan for release of GFE as far in advance as possible to allow SMA access to the interfaced equipment. The key scheduling consideration in all GFE releases is to minimize the impact to air traffic control. Interface access should be provided during low traffic periods.

Following shadow mode switch connection (with FAA verification), ARTCC personnel will certify each interface as it is returned to service in accordance with Maintenance of NAS En Route State and Air Traffic Control System, FAA Order 6100.1A. When all of the interfaces have been integrated and the SMMC has been certified to operate through the shadow mode switches, the system will be ready for the next step of site acceptance testing.

h. Transition Shadow Mode Switch Integration Testing. Transition switch testing is the final activity in the installation and checkout phase and will assure functional interface compatibility of the MCCP/MMC and the GFE connections. Testing will be conducted in accordance with the ARTCC Acceptance Test Plan (CDRL B071). ARTCC personnel must monitor this testing to ensure that it is performed in accordance with the ARTCC Site Test Procedures (CDRL B072).

i. MCCP/MMC Conditional Acceptance. A conditional acceptance will exist at the completion of installation and checkout providing that all requirements have been met and approved by FAA personnel. Site Test Data (CDRL B076) and documentation regarding installation and checkout will be retained onsite as backup documentation for the final JAI. SMA will include the test results of the installation and checkout in the Site Test Report (CDRL B075).

74. CONTRACTOR INTEGRATION AND TEST

a. Scope. This section delineates the FAA responsibilities for verifying, supporting, and monitoring SMA's activities during the contractor integration and test (I&T) phase. During this phase, SMA will integrate the MCCP/ MMC into the ARTCC NAS environment and demonstrate that the MCCP/MMC performance, with site-adapted software, meets the contractual requirements. Successful completion of a contract acceptance inspection (CAI) will result in operational site acceptance with an initial operational capability (IOC) and the transfer of the responsibility for MCCP/MMC operation and support from SMA to the FAA.

b. Contractor Integration and Test Methodology. The contractor I&T phase will begin upon successful completion of MCCP/MMC installation and checkout activities, and will be conducted in accordance with the Installation/ Checkout/Site Integration Plan (CDRL B081). Contractor I&T consists of completing the total integration of the MCCP/MMC with the GFE and performing the ARTCC site acceptance tests. The contractor I&T will be accomplished by installing and testing both off-the-shelf and developed software with the site adaptation data, and conducting the remainder of the operational site acceptance tests

in accordance with the ARTCC Site Test Plan (B071) and the ARTCC Site Test Procedure (B072). The I&T activities will be performed by SMA and monitored by ARTCC personnel.

c. Compatibility and Readiness Dry Runs. SMA will perform final dry runs of the ARTCC acceptance tests to ensure the compatibility and readiness of hardware, software, and test procedures for formal acceptance testing in accordance with the schedule in the ARTCC Site Integration Plan (CDRL B081). Each final dry run test will be monitored by SMA system assurance (quality) to ensure that approved procedures are used, that problems encountered are properly documented, and that the tests are conducted using controlled hardware and software configurations. ARTCC personnel should monitor these final dry run tests which will provide the opportunity to fully review the test proceedings, ask questions, make recommendations, and gain the necessary insight to ensure a successful formal test.

d. MCCP/MMC Integration Test with NAS Facilities. The MCCP/MMC will not be used to monitor or control ARTCC operations during the contractor I&T phase. During SMA testing activities that require use of the SMMC and system terminal equipment, EDARC will be used for air traffic control when testing MCCP/MMC interfaces with the CDC/DCC and Host Computer System (HCS). The HCS and CDC/DCC will be used when testing the EDARC interface. These testing periods will be thoroughly coordinated and scheduled to minimize operational impact. The periods of MCCP/MMC testing requiring this configuration will be scheduled during periods of low air traffic activity as determined by ARTCC management.

75. ARTCC ACCEPTANCE TESTS. ARTCC acceptance testing will be performed by SMA at each ARTCC in accordance with the schedule in the Installation/Checkout/Site Integration Plan (CDRL B081), and will be conducted in accordance with the Site Test Plan (CDRL B071) and the Site Test Procedure (CDRL B072). ARTCC personnel must monitor all acceptance tests and ensure that they are conducted as described in the installation and checkout section of this plan.

76.-79. RESERVED.

CHAPTER 8. VERIFICATION

80. FACTORY VERIFICATION

a. Three phases of verification are detailed in the MCCP/MMC engineering requirements (ER) verification requirements traceability matrix (VRTM). They are briefly described in this chapter for FAA regional information. However, in certain contractor implementation and testing, FAA site-support will be required.

b. During the subsystem acceptance test phase, engineering requirements will be verified by the method (T,D,A,I,V) designated in the VRTM at either the factory or FAA Technical Center location. This test phase includes, but is not limited to, all activities contained in Paragraph 81.

c. Regional site support is not required during this phase of verification.

81. CHECKOUT. This paragraph describes the tasks necessary for the contractor to perform checkout at MCCP/MMC FAA regional key site/production sites as follows:

a. System Installation. The contractor is responsible for installation of the MCCP/MMC system as stated in the contract. Contractor-conducted site surveys and contractor installation plans will allow each FAA site to identify particular problems or to make recommendations to the plans. The deployment section of this plan will further identify specific details.

b. Checkout. As the contractor installs the MCCP/MMC subsystem components per the site-specific installation plan, he will conduct various FAA-approved hardware and software subsystems checkout procedures. The MCCP/MMC equipment will therefore be incrementally checked out with siteadapted variations to the procedures developed during regional surveys and site plans development.

c. Site Adaptation. The contractor will adapt the MCCP/MMC system software for each site specified in the contract. Site adaptation data will be supplied to the contractor by the FAA for inclusion in the site-specific version.

82. CONTRACTOR INTEGRATION TESTING. MCCP/MMC system integration testing is a series of contractor-conducted tests and demonstrations at the FAA Technical Center and key site to ensure that the system will operate properly with all of its interfaces and supporting systems connected. The tests and demonstrations include verification of all operational functions as well as design required functions that are necessary for the MCCP/MMC system to perform. This includes fail safe/fail soft, diagnostic routines, and restarting the system after failure. Additionally, the functional and performance requirements

designated in the VRTM for system integration test will be verified during this phase of testing. The contract provides that the contractor deliver a baseline software package and that all systems will be acceptance tested with this baseline software. Any modifications, primarily software, that are required after ASM-160 has completed baselined testing at the key site will be supported by ASM-160. Any emergency software/hardware modifications may be installed during the contractor's system integration testing, but the contractor and the project office must ensure that these modifications are later incorporated into the baseline software/hardware via an NCP.

83. CONTRACTOR ACCEPTANCE INSPECTION (CAI). The MCCP/MMC VRTM site acceptance test phase lists the functional and performance requirements to be demonstrated and tested for all operational sites.

84. FAA INTEGRATION TESTING. ACT-100 will be responsible for developing test plans and procedures for FAA system level testing at the FAA Technical Center and key site. These requirements will be defined by AES and identified in the MCCP/MMC Master Test Plan.

85. SHAKEDOWN AND CHANGEOVER.

a. ASM-160/ACT-570 will be responsible for developing operational test and evaluation (OT&E) test plans and test procedures for FAA OT&E testing at the FAATC and key site. These requirements will be defined by AES and identified in the MCCP/MMC master test plan.

b. The operational shakedown testing conducted by ASM-160 at the FAA Technical Center and key site will, as a minimum, include the technical aspects of the testing to be conducted at the field sites by AF organizations. Accordingly, ASM-160 should develop and verify a generic shakedown test plan for the field.

c. The project manager is responsible for contractor testing conducted between system delivery and IOC. The regional Airway Facilities (AF) organizations are responsible for operational shakedown testing which is conducted between IOC and operational readiness demonstration (ORD).

86. JOINT ACCEPTANCE INSPECTION (JAI). When operational shakedown testing has been completed, a joint acceptance inspection will be conducted. JAI will be conducted at all operational sites in accordance with the latest version of Order 6030.45, Facility Reference Data File (RFDF). After satisfactory completion, responsibility shifts to ARTCC AF maintenance.

87.-89. RESERVED.

CHAPTER 9. INTEGRATED LOGISTICS SUPPORT

90. MAINTENANCE CONCEPT. This program will be subjected to procedures to ensure integrated logistics support as described in the SOW, and as directed by the national airspace integrated logistics support management team (NAILSMT) made up of government members (see table 9-1). Maintenance of the MCCP/MMC will comply with the maintenance philosophy and projected concept described in Order 6000.27, Transmittal of Maintenance Philosophy Steering Group (MPSG). Hardware maintenance will consist of two types: corrective maintenance (CM) and preventive/periodic maintenance (PM). Maintenance will be performed by a relatively small, multi-skilled technical work force.

a. Periodic Maintenance. As part of the maintenance planning, periodic maintenance schedules will be developed to check the MCCP/MMC to prevent or reduce the probability of a failure or degradation in subsequent service. Periodic maintenance activities will not interfere with normal FAA facility operations.

b. Corrective Maintenance. As part of maintenance planning, trouble/cause tables will be included in documentation used by maintenance technicians performing corrective maintenance procedures. Corrective maintenance is initiated following notification that equipment is inoperative (off line), or that degradation of function has occurred, or it has been determined that failure is imminent.

c. Maintenance Levels. The system design for maintenance will be predicated on the following levels of maintenance activity for maximum responsiveness, productivity, and efficiency in the use of maintenance resources. The levels consist of onsite maintenance, intermediate (work center) maintenance, and depot maintenance.

d. Onsite Maintenance. The FAA onsite maintenance consists of periodic, and corrective maintenance actions required to maintain the MCCP/MMC in a fully operational status. Onsite maintenance shall be conducted in accordance with policy and guidance set forth in Order 6000.15A, General Maintenance Handbook for the Airway Facilities.

e. Repair of Failed Line Replaceable Units (LRUs). All repairable LRUs are forwarded to the appropriate maintenance facility in accordance with the LSA and maintenance plan approved for this project.

f. Intermediate Work Center Maintenance. Maintenance is performed at this level in direct support of site-level maintenance and involves disposition, repair, service, calibration, and verification of items removed during site maintenance. It normally excludes activities requiring equipment, facilities, or skills that can be provided more economically at the depot level.

TABLE 9-1. MCCP/MMC NAILS MANAGEMENT TEAM

POSITION	REPRESENTATIVE	ORGANIZATION
Chairperson	Paul Teselle	APS-220
Training	Bob Whitfield Sandra Gander	ASM-210 AAC-942C
Staffing	Warren Lichtenberg	ASM-230
Depot Engineer	Clayton Rains	AAC-445
Depot Supply	Dick Davis	FAA Depot AAC-484A
Materiel Management	Richard DeBow	ALG-220
National Field Support	Frank Buck	ASM-160
Field Representative	Gene Nobles	ZTL
Logistics Specialist	Don Brown	SEIC

g. FAA Depot Maintenance. The depot maintenance facilities will provide support for repair, alignment, and calibration of complex equipment and modules requiring specialized skills, equipment, and procedures.

91. TRAINING. Training of personnel to provide operational, software, and hardware support will be accomplished in a two-phase training program. Phase one will be for the contractor to develop a Contract Training Plan (CDRL D002), including a training schedule, to develop all training materials, and to conduct all initial training. Initial training will be that training necessary to provide a sufficient support cadre of personnel at each site prior to system ORD. More specifics of the MCCP/MMC training program information can be found in Appendix 2 of this plan and the Contract Training Plan.

92. SUPPORT TOOLS AND TEST EQUIPMENT.

a. Standard Test and Repair Equipment. For each maintenance facility, standard test and repair equipment necessary to test and repair each equipment/system will be identified. The equipment will be adequately described for easy identification and procurement, and will include the manufacturer and model number. Standard catalog test equipment will be specified by the contractor unless otherwise approved by the FAA.

b. Special Test and Repair Equipment. For each maintenance facility, all special test equipment required for maintenance of system equipment will be identified.

Special test equipment will be used only if standard catalog test equipment cannot perform the test function. In addition to special test equipment, any special repair equipment required to repair system assemblies, subassemblies, modules, and, where applicable, components will be identified.

c. Maintenance Tools. For each maintenance facility, all tools, common and special, required for maintenance and repair will be identified. Common tools are defined as tools required for maintenance of each system and not available as a standard catalog item from the General Services Administration (GSA). The standard equipment requiring special maintenance tools will be identified.

d. Maintenance Personnel. Maintenance planning will consider the levels of maintenance personnel. The MCCP/MMC will be designed such that all corrective, periodic, and software maintenance will use staffing at or below the current levels throughout the equipment/system life.

e. Software Maintenance Requirements and Analysis. Analyses of the software maintenance requirements of the MCCP/MMC will determine the most cost-effective maintenance support plan for each software and firmware item, including commercially available items.

f. Software Maintenance Types. Software maintenance is the performance of all software activities (correction, modification, extension, and enhancement) required to keep a system operational. Software maintenance planning addresses the following categories of maintenance activities:

(1) Perfective. Maintenance performed to eliminate inefficiencies, enhance performance, or improve maintainability.

(2) Adaptive. Maintenance performed in response to changes in data and processing environments.

(3) Corrective. Maintenance performed to correct failures in meeting performance criteria specified in the system design.

g. Software Maintenance Levels. Software maintenance levels consist of:

(1) Onsite Maintenance. Software maintenance at the MCCP/MMC will be limited to software system version installation, local adaptation data base modification, test verification, identification, correction and reporting of problems, and collection of any supporting data.

(2) FAA Technical Center Maintenance. ASM-160 will be the focal point for creation and distribution of software system version releases to operational sites, and for providing diagnostics support to the sites.

h. Software Maintenance Activities. Maintenance planning and analysis will consider onsite and ASM-160 software maintenance. The analysis and planning will address the cost effectiveness of the software maintenance methods.

i. Hardware and Software Maintenance Facilities. The support analysis and maintenance plans will be used to identify facility requirements at the Technical Center for maintenance operations, personnel, standard and special support equipment, tools and test equipment, and software packages to support maintenance of the hardware and the software. Software maintenance tools will be built upon the base of tools used during design and implementation and will be delivered complete with design and user documentation.

j. Installation and Test. During installation and checkout, all hardware and software maintenance activities will require the notification of the designated FAA site representatives prior to the beginning of a maintenance activity, and upon completion of the activity including an assessment of the hardware status as a result of the work performed. No maintenance activity will begin prior to FAA coordination and approval.

k. Maintenance Verification/Certification. During installation and checkout, all hardware and software maintenance activities will require verification/certification checks that the system, subsystem, or unit involved can perform its assigned function if put into operational use. Verification actions performed must demonstrate compliance to ER, Paragraph 4.5.2.2, Installation and Checkout Tests.

1. Maintenance reporting. During installation and checkout, all hardware and software maintenance activities will be fully documented and provided to the FAA site representatives for accounting purposes. The documentation provided will include identifying the data and time the activity was started and completed, the individual performing the work, the reason for performing the maintenance activity, the system status prior to beginning the activity and at the time of the completion, and all parts and materials consumed.

93. SUPPLY SUPPORT. Requirements for supply support are defined in the SOW and the accompanying CDRLs and DIDs. Details including warranties will be provided by the contractor and finalized during the commissioning conference. This includes determining the feasibility of a dedicated repair service for two years following site acceptance.

94. VENDOR DATA AND TECHNICAL MANUALS. Vendor data will be submitted in compliance with the CDRL and DID requirements for compatibility with the OLSA data base. As spelled out in the SOW, technical manuals will be off-the-shelf in compliance with contractor standards.

95. EQUIPMENT REMOVAL. The contractor will remove the SMMC equipment after completion of the MCCP/MMC shadow mode operation phase. The FAA Depot will provide initial disposition instructions to all region/center property managers. Upon receipt of the depot disposition instructions, the property manager will use such instructions to inform the custodian of the appropriate future disposition of each item/system, and will provide a copy of such instructions to the custodian.

96. FACILITIES. Installation of the MCCP/MMC equipment will comply with the NAS transition plan for the area control facilities (ACFs) as provided by APS-120 and AES-420.

97.-99. RESERVED.

APPENDIX 1. REGIONAL REPRESENTATIVES, SUPPORT SERVICES, AND ONSITE COORDINATORS

1. MCC REGIONAL (RMM) REPRESENTATIVES

AAL-460, Bob Hodge
FAA
701 C Street, Box 14
Anchorage, AL 99513

ACE-401A Richard Pogue
FAA
601 East 12th Street
Federal Building
Kansas City, MO 64106

AEA-400, A.J. Wilcox
FAA
JFK International Airport
Fitzgerald Federal Bldg.
Jamaica, NY 11430

AGL-421, Joseph Szanati
FAA
O'Hare Lake Office Center
2300 East Devon Avenue
Des Plaines, IL 60018

ANE-420, Irving Boyton
FAA
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Burlington, MA 01803

ANM-412, Rick Wursher
FAA
17900 Pacific Highway South
Seattle, WA 98168

ASO-401, Paul Smith
FAA
P.O. Box 20636
Atlanta, GA 30320

ASW-403C, Don Berkowicz
FAA
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P.O. Box 1689
Fort Worth, TX 76193

AWP-400
FAA
P.O. Box 92007
Worldway Postal Center
Los Angeles, CA 90009

2. SUPPORT SERVICES.

AAC-942c, Sandra Gander
FAA
Mike Monroney Aeronautical Center
6500 South MacArthur
P.O. Box 25082
Oklahoma City, OK 73125

ASM-160, Frank Buck
FAA Technical Center
Atlantic City International Airport, NJ 08405

3. ARTCC ONSITE COORDINATORS.

ARTCC		TELEPHONE NUMBER
FAA AFS ZME ARTCC 3229 Democrat Road Memphis, TN 38118	Ray Bendall David Howell (F&E)	FTS: 222-3182 COML: (901) 365-0970 FTS: 222-3181
FAA AFS ZTL ARTCC 299 Woolsey Road Hampton, GA 30228	Tom Passmore Richard Farrell (F&E)	FTS: 249-3888 COML: (404) 572-3888 FTS: 249-7971
FAA AFS ZJX ARTCC P.O. Box 98 Hilliard, FL. 32046	Jim Ansley Fred Torrible (F&E)	FTS: 965-1610 COML: (305) 632-1610 FTS: 965-1662
FAA AFS ZMA ARTCC 7500 N.W. 58th Street Miami, FL 33166	Felix Enriquez James Harris (F&E)	FTS: 820-1311 COML: (305) 592-9770 FTS: 820-1201
FAA AFS ZOA ARTCC 5125 Central Ave. Fremont, CA 94536	Dave Dart	FTS: 449-6382 COML: (415) 797-3200
FAA AFS ZLA ARTCC 2555 East Ave. 'P' Palmdale, CA 93550	Fred Dalton	FTS: 968-8414 COML: (805) 947-4101
FAA AFS ZKC ARTCC 1801 E. Loula St., Rm. 1001 Olathe, KS 66062	Keith Nease	FTS: 753-1320 COML: (913) 79-2330
FAA AFS ZDC ARTCC 825 East Market St. Leesburg, VA 22075	Ben Thompson	FTS: 925-4630 COML: (703) 771-3600
FAA AFS ZNY ARTCC MacArthur Airport, Johnson Ave. Ronkonkoma, N 11779	Tony Hussey	FTS: 663-3508 COML: (516) 737-3508
FAA AFS ZAU ARTCC 619 Indian Trail Road Aurora, IL 60506	Will Kemp	FTS: 388-9261 COML: (312) 897-2061

FAA AFS ZID ARTCC Indianapolis Int'l Airport, Bauman Rd. Indianapolis, IN 46241	Jim Ecoff	FTS: 332-0277 COML: (317) 247-2205
FAA AFS ZMP ARTCC 512 Division Street Farmington, MN 55024	Bob Otis	FTS: 784-3246 COML: (612) 463-3371
FAA AFS ZOB ARTCC 326 East Lorain Street Oberlin, OH 44074	Bob Ontolchick	FTS: 292-8267 COML: (216) 774-1071
FAA AFS ZBW ARTCC Northeastern Blvd and Harris Road Nashua, NH 80501	Ed McCosh	FTS: 834-6729 COML: (603) 889-1171
FAA AFS ZDV ARTCC 2211 17th Ave. Longmont, CO 80501	F. McKinney	FTS: 323-4433 COML: (303) 651-4400
FAA AFS ZLC ARTCC 2150 W. 700 North Salt Lake City, UT 84116	G. Woodward	FTS: 586-3273 COML: (801) 539-3250
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FAA AFS ZAB ARTCC 8000 La Blvd NE, Rm. 104 Albuquerque, NM 87109	Norman Kusnetz	FTS: 476-0403 COML: (505) 823-0403
FAA AFS ZFW ARTCC P.O. Box 668 13800 FAA Rd, Euless, TX 76040	David Rye	FTS: 334-1540 COML: (817) 540-7540
FAA AFS ZHU ARTCC 16600 J.F. Kennedy Blvd. Houston, TX 77032	John Ballard	FTS: 527-5417 COML: (713) 230-5417
FAA AFS ZHN ARTCC 4202 Diamond Head Rd Honolulu, HI 96816	Roger Merkamp	FTS: 449-6479 COML: (415) 797-3200
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APPENDIX 2. MCCP/MMC SYSTEM TRAINING

1. TRAINING OVERVIEW.

a. Training Objectives. All levels of the FAA are concerned with the training required for the implementation of the MCCP/MMC. Training resources must be fully justified in terms of cost, time, and effectiveness. Travel costs and length of time personnel are away from their facility must be minimized. Training must be conducted in sufficient quantity and quality to allow personnel to effectively perform the mission of the FAA, specifically, to enable the ARTCCs to maintain continuous air traffic control service without compromising air safety during the transition from the current system maintenance monitor console (SMMC) and various other monitoring devices to the new combined maintenance control center/maintenance monitor console (MCCP/MMC). The objective of this plan is to provide FAA policy and guidance in matters involving the training of FAA personnel who will implement the MCCP/MMC at the FAA Academy, FAA Technical Center, and the ARTCCs, and who will manage, certify, operate, and support the MCCP/MMC through its life cycle.

b. MCCP/MMC Training Requirements. Timely and effective MCCP/MMC implementation demands properly trained personnel to manage, operate, and support the system during the implementation effort and throughout the life of the system. Determination of accurate training requirements consistent with FAA standards involved consideration of desired training end results, uniformity and quality of training, student population, duration of training, and lead time to construct the training program.

The training requirements to be listed in this plan will be a compilation of requirements submitted by FAA Headquarters, branches, regions, the FAA Technical Center, the FAA Academy, and the ARTCCs.

(1) General Requirements. General MCCP/MMC training requirements identified are:

(a) Train an appropriate number of FAA personnel to manage, operate, maintain, and support the MCCP/MMC.

(b) The contractor conducts resident and OJT training.

(c) Limit the number of personnel who are away from their facility at any one time for training.

(d) Complete training in time to ensure that facility operational requirements are met.

(2) Identified Training Areas. The following are the types of training needed to implement and support the MCCP/MMC:

(a) User/Operator training for systems engineers.

(b) Software operation/maintenance for system administrators.

(c) Hardware operation/maintenance for electronic technicians.

Graduates of the MCCP/MMC training courses will have acquired the skills and knowledge to operate and maintain the system, which includes:

(a) Online verification of system performance in accordance with FAA directives.

(b) Software maintenance for all NAS operational software.

(c) System initialization and operation tasks.

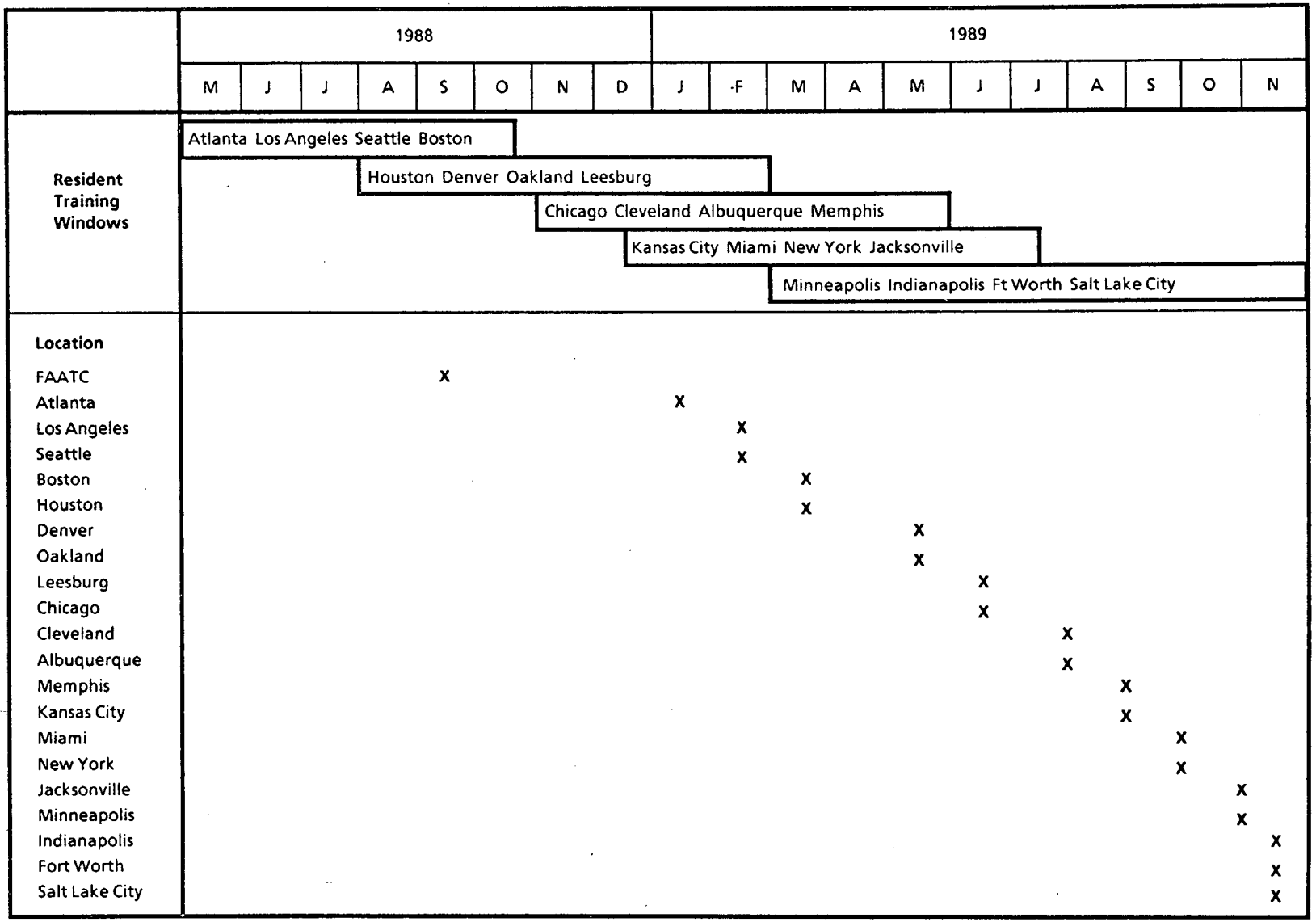
(d) Procedures and techniques for recovery from system failures (all modes).

(e) All tasks associated with hardware maintenance.

c. General Training Concept. This plan is based on the requirement for properly indoctrinated and trained personnel at FAA headquarters, regions ARTCCs, the FAA Technical Center, and the FAA Academy when the MCCP/MMC implementation begins. Additional training requirements may be levied by a need for trained repair personnel at the FAA Depot, depending on the FAA's maintenance and repair requirements for the MCCP/MMC. All MCCP/MMC training consists of on-the-job training courses or classroom/lab resident courses. There is no computer-based instruction (CBI) training in the MCCP/MMC program.

(1) Training Schedules. Schedules will be provided as part of contract training plan, as a supplement to this document when available. See Figure 1.

(2) Resident Training Courses and Training Locations. All initial resident training will be conducted at the contractor's training facility. Onsite operator training at each ARTCC will be conducted by contract personnel.



Note: X = Site delivery of OJT and start of shadow mode of operation

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FIGURE 1. MCCP/MMC TRAINING IMPLEMENTATION SCHEDULE

(3) FAA Academy Implementation. The FAA Academy MCCP/MMC equipment will be delivered, installed, and made operational by the contractor. FAA Academy instructors will receive training from the contractor during the initial training phase. The contractor will deliver training materials for developed courses to the FAA Academy. The FAA Academy will conduct follow-up and attrition training on the MCCP/MMC.

(4) ARTCC Personnel Training Concept. It is planned that a few AF technical support personnel from each ARTCC will have the opportunity to participate in installation, integration and test, and operational shakedown and changeover at other sites prior to the arrival of equipment at their ARTCC. This should occur after their training has been completed. ARTCC personnel participation will allow those persons to gain hands-on experience, as well as lend some extra support to the site undergoing MCCP/MMC implementation.

(5) ASM-160 Personnel Training Concept. MCCP/MMC training for ASM-160 personnel will be scheduled to ensure that sufficient personnel will have completed training prior to the start of operational support testing of the MCCP/MMC at the ACT, and to provide field support by the IOC date of the first ARTCC to implemented.

(6) FAA Headquarters/Regions Personnel Training Concept. System training for Headquarters MCCP/MMC program personnel and region personnel will be accommodated by using, on an as-needed/as-available basis, selected MMCP/MMC courses developed for the FAA.

(7) FAA Depot Training Concept. The depth of training required for each category of FAA Depot personnel will depend on the final maintenance and provisioning options for MCCP/MMC, and will be addressed in greater detail when such information is available.

d. Training Time-Phasing Considerations.

(1) A prime factor in phasing MCCP/MMC training is the requirement to have sufficient personnel trained at the ARTCCs prior to ORD, yet have no more than 25 percent of an occupational specialty training based on restraints (to be submitted by the contractor as part of the contract training plan).

(2) Factors such as differences in ARTCC staffing requirements and student availability will have significant impact on the final schedule. Since the FAA will be responsible for MCCP/MMC data base maintenance after IOC, software administrator training and user operation training will receive the initial emphasis. Contractor hardware maintenance will be provided for the MCCP/MMC for two years at each installation site.

e. Training Support. Support for MCCP/MMC training will be required from among multiple discipline within the FAA in a wide variety of training-related areas. Training support includes:

(1) FAA Academy MCCP/MMC used for MCCP/MMC training.

(2) Periodic and corrective maintenance of MCCP/MMC hardware and software for the FAA Academy MCCP/MMC installation.

(3) MCCP/MMC depot level repair for the FAA Academy installation.

(4) MCCP/MMC provisioning for the FAA Academy installation.

(5) MCCP/MMC technical documentation to support the MCCP/MMC in the training environment, including that required for research, development, and production of student training material for FAA Academy use and field training.

(6) MCCP/MMC test equipment, support equipment, and tools.

(7) Review and approval of all training materials.

(8) Revision of existing training materials, when appropriate, to incorporate hardware and software additions or changes.

2. ORGANIZATIONS AND RESPONSIBILITIES. The following FAA and contractor organizations have MCCP/MMC training responsibilities.

a. FAA Headquarters.

(1) APT-300, Technical Training Programs Division, is responsible for ensuring the accomplishment of the ASM-210 and ACT-17 training requirements.

(2) ASM-210, Maintenance Operations Program, is responsible for determining AF training requirements and for providing those requirements to APT-300.

b. FAA Regions. FAA regions will ensure that the MCCP/MMC operational training requirements of the AF divisions are met, and will facilitate normal personnel career progression consistent with the national training program.

c. Air Route Traffic Control Centers. AF sector managers will ensure that ARTCC personnel receive training appropriate to their position requirements, consistent with national regional directives, and AMP standards. These managers will provide requests for MCCP/MMC training to ASM-210 through the regions as soon as actual training requirements are known. Early identification of requirements will facilitate more realistic guidance to the contractor.

d. FAA Technical Center. Managers will ensure that support personnel receive training appropriate to their position requirements, consistent with national directives, to enable participation in FAA Technical Center testing six months after final contract award, and to support MMCP/MMC field implementation beginning at IOC of the first ARTCC. ACT-17, Human Resource Development Branch, is responsible for determining ACT training requirements and for providing those requirements to APT-300.

e. FAA Academy. The FAA Academy will:

(1) Review and comment on training material submitted by the MCCP/MMC contractor during the contractual period to ensure that the material meets the needs and standards of the FAA.

(2) Prepare instructors for the MCCP/MMC training program.

(3) Accomplish the training program levied by the Office of Personnel and Technical Training.

(4) Provide personnel to validate the training laboratory exercises prior to resident training.

f. MCCP/MMC System Contractor. The MCCP/MMC contractor will submit a training plan, training course design guides, and training course materials and tests in accordance with the MCCP/MMC contract. All material will be reviewed, revised, and approved by the FAA. The MMC acquisition contractor will:

(1) Conduct 100 percent of the initial MCCP/MMC training until all FAA personnel required for initial operational support have been trained. At that time the FAA Academy will assume the instructional responsibility, using FAA Academy instructors.

(2) Provide contractor-conducted early training for FAA Academy and FAA Technical Center personnel. The early training may be concurrent with the training for the personnel at the first ARTCC site.

3. MCCP/MMC SYSTEM TRAINING DEVELOPMENT. Training development for the MCCP/MMC will be provided by the contractor to meet the training requirements listed in the contract. Development will follow established procedures and schedules listed in the contract for the MCCP/MMC. Training development will be accomplished as described in the following paragraphs.

a. Contract Training Plan. The contract training plan will contain:

(1) Description of each course.

(2) Course instructional methods.

(3) Class size (12 for resident training).

(4) Course duration.

(5) Course objectives.

(6) Student prerequisites.

(7) Standards of achievement.

(8) Conditions of achievement.

(9) Training time for each objective.

(10) Training methodology for each objective (lecture, laboratory, hands-on).

(11) Training outcomes and type of testing to measure accomplishment of objectives.

(12) Equipment required for each course.

(13) Equipment summary for total training program.

(14) Overall schedule of training classes and proposed course sequences.

(15) An analysis of possible problems/conflicts.

(16) Provisions for quality assurance.

b. Training Course Design Guides. Training course design guides will be delivered to the FAA Academy. During course development the course design guides will be used as requirements documents for the format and content of the training. In the initial training phase they will be used as quality assurance standards documents.

(1) Training Course Design Guide Content. Training course design guides will be delivered as four-part documents and will contain:

(a) Part I.

1. Course outline and description.

2. Prerequisites.

3. Optimum and maximum class size.

4. Course, terminal, and enabling objectives.

5. Times to achieve training objectives.

6. Sequence of course material.

(b) Part II.

1. Estimate of type and amount of training material.

2. List of training material furnished to students.

3. List, description, and cost of system/equipment, including type, source and costs.

4. List of technical documentation.

5. List of special or unique test equipment, including type, source, and costs.

6. Description and location of contractor-furnished training facility.

(c) Part III.

1. Instructor qualifications.

2. Class hours.

3. Treatment of holidays occurring during course.

4. Lodging and dining facilities in the area.

5. Availability of/need for local transportation.

6. Contacts for class scheduling and reporting.

(d) Part IV. Man-hour estimates for course development and presentation.

c. Training Course Materials.

(1) Training Course Materials Content. Training course materials will be developed in accordance with the course design guides and may consist of:

(a) Technical manuals (theory of operation and operational procedures, maintenance procedures and parts lists, and installation check-out procedures).

(b) Schematics, block diagrams, and logic diagrams.

(c) Software flow charts and logic diagrams.

(d) Second-level diagrams.

(e) Visual aids, drawings, and charts.

(f) Audio-visual training aids.

(g) Instructor guides and student study guides.

(h) Course lesson plans.

(i) Laboratory exercises.

(j) Written and performance tests.

(2) Training Course Material Review. The FAA will review and approve training course material for all courses prior to contractor-conducted training.

(3) Training Tests. Training tests are used to measure student achievement against the training objectives, and will be reviewed, if necessary.

4. PERSONNEL TRAINING.

a. Training FAA Technical Center Personnel. Training for personnel located at the FAA Technical Center, including those assigned to ACT and APS activities, should be scheduled so that sufficient personnel will be available to provide operational test support at the FAA Technical Center, and to provide field support by the time the first ARTCC to be implemented reaches IOC. Training will be conducted by the contractor. FAATC occupational specialities and numbers of personnel, including those at APS activities, requiring training have not been identified.

b. FAA Mike Monroney Aeronautical Center Technical Training. The FAA AF MCCP/MMC hardware and software instructors (refer to table 1) should complete their training early during the initial training phase. This will enable them to participate in hands-on training, and allow sufficient time for the instructors to prepare and become familiar with lesson material. Therefore,

the FAA instructors must be scheduled into contractor-conducted classes during the initial training phase. FAA instructors will assume 100 percent of MCCP/MMC instructional duties at the completion of the initial training phase by the contractor. No more than one third of the MCCP/MMC instructors will be in training at any one time. The staff engineer and electronics technicians will also require early training.

c. ARTCC AF Technical Training. AF personnel to provide initial staffing should complete MCCP/MMC training prior to IOC. No more than 25 percent of each occupational specialty should be away from the ARTCC for training at any one time. AF personnel who have been identified as requiring training are shown in table 2-1.

d. Attrition Training. As the training program for the MCCP/MMC becomes better defined, long-range planning for attrition and developmental training will occur and will be addressed herein. This training will be provided by the FAA Academy. Regional division managers should keep APS-110 apprised of attrition trends relating to MCCP/MMC training.

5. TECHNICAL TRAINING COURSES. MCCP/MMC training will be conducted in two phases. The first phase is initial training to be conducted by the contractor. Personnel trained by the contractor should be sufficient to provide full support at ORD. The second phase is training conducted at the FAA Academy. Due to the requirement for timely training completion, special procedures may be implemented regarding contractor-conducted training courses for the first ARTCC Sites, FAA Technical Center, and FAA Academy.

a. User/Operator Training. This training is targeted for system engineers (SEs), assistant SEs, and any other designated persons performing system engineering duties. Training is divided into two courses, SE user and SE operator. SE user training will be an in-depth resident training course, and will provide independent training in the operation, use, and management of MCCP/MMC system software and hardware. SE operator training will be a hands-on training course provided as field-conducted OJT. Personnel completing this course will obtain skills needed to effectively perform an SE's normal duties in the operation and use of the MCCP/MMC system.

b. Software Operation/Maintenance (Resident) Training. This training will provide the necessary skill level for job performance the system performance specialist (SPS) or anyone else designated to have applications program, data base maintenance, and software maintenance responsibility.

c. Hardware Operation/Maintenance (Resident) Training. This training is for electronic technicians, and will provide skills needed to operate and use available on-line/off-line diagnostics to perform corrective and periodic maintenance on the MCCP/MMC system. This training will enable the technician to localize and repair failures to the LRU level.

TABLE 2-1. TRAINING REQUIREMENTS

a. User/Operation.

(1) System Engineer User (Resident).

		Totals
ARTCCs	(3x20)	60
FAA Technical Center	3	3
Mike Monroney Aeronautical Center	6	6
Admin/Overhead	3	3
		72

(2) System Engineer Operation (OJT).

		Totals
ARTCCs	(10x20)	200
FAA Technical Center	3	3
Mike Monroney Aeronautical Center	6	6
Admin/Overhead (Includes 20 ARTCC PDOs)	23	23
		232

b. Software Operation/Maintenance (Resident).

		Totals
ARTCCs	(2x20)	40
FAA Technical Center	6	6
Mike Monroney Aeronautical Center	6	6
Admin/Overhead	8	8
		60

c. Hardware Operation/Maintenance (Resident).

		Totals
ARTCCs	(2x20)	40
FAA Technical Center	6	6
Mike Monroney Aeronautical Center	6	6
Admin/Overhead	8	8
		60

APPENDIX 3. ACRONYMS

ACT	FAA Technical Center
AES	Systems Engineering
AF	Airway Facilities
ALG	Acquisition and Material
APS	Program Engineering Service
ARTCC	Air Route Traffic Control Center
ATO	Air Traffic Operations
ATR	Air Traffic Plans and Requirements Service
CCB	Configuration Control Board
CCC	Central Computer Complex
CCCH	Host Central Computer Complex
CCMS	Central Control and Monitoring System
CDC	Computer Display Channel
CDRL	Contract Data Requirements List
CERAP	Combined Center/Radar Approach Control
CONUS	Continental United States
COTR	Contracting Officer's Technical Representative
CPU	Central Processing Unit
CRT	Cathode Ray Tube
CTS	Coded Time Source
CTSW	Communications Transfer Switch
DCC	Display Channel Complex
DEC	Digital Equipment Corporation
DID	Data Item Description
DRG	Data Receiver Group
EARTS	En Route Automatic Radar Tracking System
ECM	Environmental Control Module
EDARC	Enhanced Direct-Access Radar Channel
ER	Engineering Requirements
ESMMC	Enhanced System Maintenance Monitor Console
FAA	Federal Aviation Administration
FSDPS	Flight Service Data Processing System
GFE	Government Furnished Equipment
GNAS	General National Airspace System
ICC	Intelligent Communications Controller
IMCS	Interim Monitor and Control Software
IOC	Initial Operating Capability
JAI	Joint Acceptance Inspection
LAN	Local Area Network
LRU	Line Replaceable Unit
LSA	Logistics Support Analysis
MCC	Maintenance Control Center
MCCP/MMC	Maintenance Control Center Processor/Maintenance Monitor Console
MMS	Maintenance Management System
NADIN	National Data Interchange Network

NAPRS	NAS Reporting System
NAS	National Airspace System
NCP	NAS Change Proposal
NRKM	Non-Radar Keyboard Multiplexor
ORD	Operational Readiness Demonstration
PCS	Power Conditioning System
PIDP	Programmable Indicate Data Processor
PIP	Project Implementation Plan
PTSW	Peripheral Transfer Switch
PVD	Plan View Display
RAPPI	Random-Access Plan Position Indicator
RCAG/NAVID	Remote Center Air/Ground Communication Facility/Navigational Aid
RCL	Radio Communications Link
RMA	Reliability, Maintainability, and Availability
RMMS	Remote Maintenance Monitoring System
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SCB	Serial Communications Board
SE	Systems Engineer
SEI	System Engineering and Integration
SMA	Systems Management American Corporation
SMMC	System Maintenance Monitor Console
SOW	Statement of Work
TOR	Technical Onsite Representative
TRACON	Terminal Radar Approach Control Facility
VRTM	Verification Requirements Traceability Matrix
WDT	Watch Dog Timer